The RUBBER AGE

April, 1943

TARZAC

A

PLASTICIZER

for Oil Resistant Synthetic Rubbers

CAN AID YOUR SPECIFICATION WORK

TARZAC

plasticizes and smoothes permanently the oil resistant synthetic rubbers, giving high tensile and elongation.

TARZAC

extraction in solvents is small at room or elevated temperatures.

TARZAC

has low volatility at mixing temperatures—contributes to better mill room working conditions.

TARZAC

compounds have small volume change on heat aging.

TRY TARZAC TODAY

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

Newsletter No. 4
APRIL, 1943

Published by Rubber Chemicals Division of DU PONT

RPA No. 3 AND RPA No. 4 AID PROCESSING OF CRUDE AND RECLAIMED RUBBERS

THE RPA'S have been widely used for many years by the most progressive rubber manufacturers to peptize crude rubber and improve the processing qualities of rubber stocks. Their use has materially decreased breakdown time and given manufacturers additional mill capacity without requiring the installation of additional equipment. This is of major importance at the present time when it is necessary to make the best possible use of all existing facilities and manufacturing equipment. Also, the increased use of synthetics requiring relatively long breakdown cycles has had the effect of reducing the capacity of available equipment.

RPA NO. 4, a relatively new member of the group of RPA's, is the preferred peptizer for crude and reclaimed rubber. Although its cost per pound is somewhat higher than that of the other RPA's, its use cost is the lowest. RPA No. 4 is approximately 2.6 times as active as RPA No. 3 for softening and peptizing crude rubber. When substituted in this ratio, it is much more economical to use as is shown in the accompanying table based on current prices.

TABLE 1—Relative Value of RPA No. 3 and RPA No. 4 for Peptizing Crude Rubber

Material	Cost per lb.	Use Cost
RPA No. 3	$0.46	$0.46
RPA No. 4	0.80	0.31

Wide use of RPA on a factory scale has conclusively proved its economic advantage over straight mechanical mastication as a means of softening crude rubber. A comparison based on the relative strength of RPA No. 3 and RPA No. 4 shows considerable advantage for No. 4. For example, if .3 lb. RPA No. 3 per 100 lbs. of rubber were used at a given temperature and time of mastication, the substitution of .116 lb. RPA No. 4 under the same conditions would represent a saving of $0.045 per 100 lbs. for *breakdown alone*. Further, economies in power would result from the fact that RPA No. 4 is effective at masticating temperatures lower than those required with RPA No. 3.

RECLAIMED RUBBER may also be broken down and effectively softened by the use of the RPA's. Reclaimed rubber plasticized with the aid of RPA No. 3 or RPA No. 4 exhibits the following advantages over that broken down without RPA:

1. Softer and more homogeneous material with shorter time of mastication.
2. Gives smoother extruding and calendering stock.
3. Smaller quantities of physical softeners required as processing aids. This improves quality of vulcanizate.

RPA No. 4 does not exhibit the same economic advantage over RPA No. 3 in reclaimed rubber as it does in crude. However, it has been determined that when used on an equal cost basis, RPA No. 4 is at least as effective as RPA No. 3. The exact substitution ratio is difficult to determine because of variations in composition of the reclaim. We therefore suggest that initial plant runs be conducted using RPA No. 4 in quantities approximating 57% of the amount of RPA previously employed. For most purposes 1% of RPA No. 3 on the rubber hydrocarbon present is sufficient and correspondingly, .57% RPA No. 4 should provide suitable plasticizing.

The results of one series of tests comparing RPA Nos. 3 and 4 for peptizing reclaimed rubber are shown in Table II below. Plasticity-recovery* were measured after milling 500 grams of stock on a 12-inch laboratory mill.

TABLE 2—The Comparison of RPA No. 3 and RPA No. 4 for Plasticizing Whole-Tire Reclaim Rubber

Material	Milling Time at 100°C.—Min	% Used on Rubber Hydrocarbon	Plasticity-Recovery*
RPA No. 3	15	1%	139-78
RPA No. 4	15	0.57%	131-66
Control: No RPA	15	None	154-102

*Williams Parallel Plate Plastometer. The lower numbers indicate the greatest plasticity or softest stock.

Through the mill

BUNA S—Acceleration with 2-MT alone, or in combination with Accelerator 808 results in stocks having exceedingly high resilience. Use 2-MT-808 Buna S (GR-S) carcass and tread stocks to obtain vulcanizates having higher tensile strength and elongation at break and low hysteresis loss.

Thionex acceleration in Buna S (GR-S) provides a fast rate of cure and a long, flat curing plateau. The vulcanizates have excellent stress-strain properties. The long curing range of GR-S stocks accelerated with Thionex suggests their use for a variety of products.

ALLOCATIONS for NEOPRENE from Du Pont are now made as Neoprene GN and Neoprene—Other. When applying for allocation on Form PD-36-A, be sure to consider requirements for Neoprene Types FR, ILS, G, KNR, CG, E, M and Neoprene Latex Types 571 and 60 and group them separately from those for Neoprene Type GN —under Neoprene—Other.

CONSERVATION ORDER M-103 was amended by the War Production Board on January 21, 1943. The original order and previous amendments restricted the sale, use and purchase of all dyestuffs (including rubber colors) derived from anthraquinone. In addition to those restrictions, this new amendment restricts the sale and purchase, with certain specific exemptions, of all other dyestuffs (including rubber colors) and organic pigments. A copy of the Order, a letter explaining how orders for rubber colors are to be handled and also a list of du Pont rubber colors and their classification will be sent upon request.

DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

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Announcing OR-25

A NEW TYPE OF HYCAR

You are familiar with Hycar OR-15. The following data are presented for the purpose of providing a basis for comparison between these two types, OR-15 and the new OR-25.

Typical Compounds of Hycar OR-15 and OR-25

Compound	1601-HCR-5	1601-HCR-6	1601-HCR-9	1601-HCR-10	1601-HCR-11	1601-HCR-12
Hycar OR-15	100.0	.....	100.0	.....	100.0	.....
Hycar OR-25	.....	100.0	.....	100.0	.....	100.0
Zinc oxide	5.0	5.0	5.0	5.0	5.0	5.0
Stearic acid	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	1.5	1.5	0.5	0.5	.....	.....
Tetramethyl thiuram disulfide	.....	.....	.....	.....	3.0	3.0
Benzothiazyl disulfide	1.5	1.5	1.5	1.5	3.0	3.0
Tetrone A	.....	.....	0.75	0.75	.....	.....
Plasticizer SC	.....	.....	15.0	15.0	15.0	15.0
Coumarone-indene-resin	10.0	10.0	.....	.....	.....	.....
Tributoxy ethyl phosphate	.....	.....	15.0	15.0	15.0	15.0
Dibutyl phthalate	15.0	15.0	.....	.....	.....	.....
Soft black (1)	100.0	100.0	.....	.....	.....	.....
Semi-reinforcing black (2)	.....	.....	70.0	70.0	70.0	70.0
	233.5	233.5	208.25	208.25	211.5	211.5

Physical Properties of the Vulcanizate

Original						
Min. Cure at 310°F	45	45	45	45	45	45
Modulus at 300%	875	615	1850	1500	1250	720
Ultimate Tensile	1900	1575	2810	2360	2900	2000
Ultimate Elongation	650	730	475	420	665	675
Flexible to °F Loop Method	−14	−32	−50	−68	−50	−68
Brittle at °F Loop Method	−50	−68	−94	−104	−86	−94
A.S.T.M.—SAE Parallel Plate —40°F	Broke	Broke	OK	OK	OK	OK
Bend Test —65°F	Broke	Broke	Broke	OK	Broke	OK
Sp. Gr.	1.28	1.26	1.21	1.20	1.21	1.20
Shore Hardness	60	55	55	54	52	48
% Lupke Rebound	54	71	70	75	66	74
% Comp. Set A.S.T.M. Method B	9	9	6	4	12*	10* 15†
Constant deflection 70 hrs. at 212°F	62	60	40	36	44*	40* 55†
Aged in GEER OVEN 70 hours at 212°F						
Ultimate Tensile	1350	1420	2700	2350	2600	2250
Ultimate Elongation	350	300	300	285	365	355
Shore Hardness	76	72	62	63	64	61
180° Bend	OK	OK	OK	OK	OK	OK
Immersed in ASTM-SAE Oil Aniline Pt. 159°F 70 hours at 212°F						
Ultimate Tensile	1450	1350	2475	1880	2550	1950
Ultimate Elongation	505	580	315	280	385	450
Shore Hardness	65	54	65	58	65	51
% Volume Change	−3	+3	−7	+1	−8	+1
Immersed in AN-VV-O-366 Oil Aniline Pt. 189°F 70 hours at 212°F						
Ultimate Tensile	1200	1125	3000	2200	2200	2100
Ultimate Elongation	315	340	335	305	350	410
Shore Hardness	68	59	70	60	67	60
% Volume Change	−5	−2	−11	−3	−11	−6
Immersed in 100 Octane Gas 70 hours at R.T.						
Ultimate Tensile	1800	1050	2300	1925	2150	1700
Ultimate Elongation	675	640	465	360	550	600
Shore Hardness	60	52	57	54	54	47
% Volume Change	0	+2	−1	+1	−1	+1
Immersed in 40% Aromatic Gas 70 hours at R.T.						
Ultimate Tensile	750	400	1290	950	1500	950
Ultimate Elongation	530	340	275	215	470	400
Shore Hardness	47	38	50	50	44	35
% Volume Change	+17	+26	+15	+22	+18	+24

(1) Thermax used.
(2) Gastex used.

* ASTM D-395-40T 30% Deflection.
† ASTM D-395-40T 40% Deflection.

During the past 9 months experimental quantities of this new rubber, OR-25, have been manufactured for one specific war application. This trial period permitted us to stabilize methods of manufacture and prove the product both in the laboratory and the field. Now it is being made generally available, subject of course to government regulations.

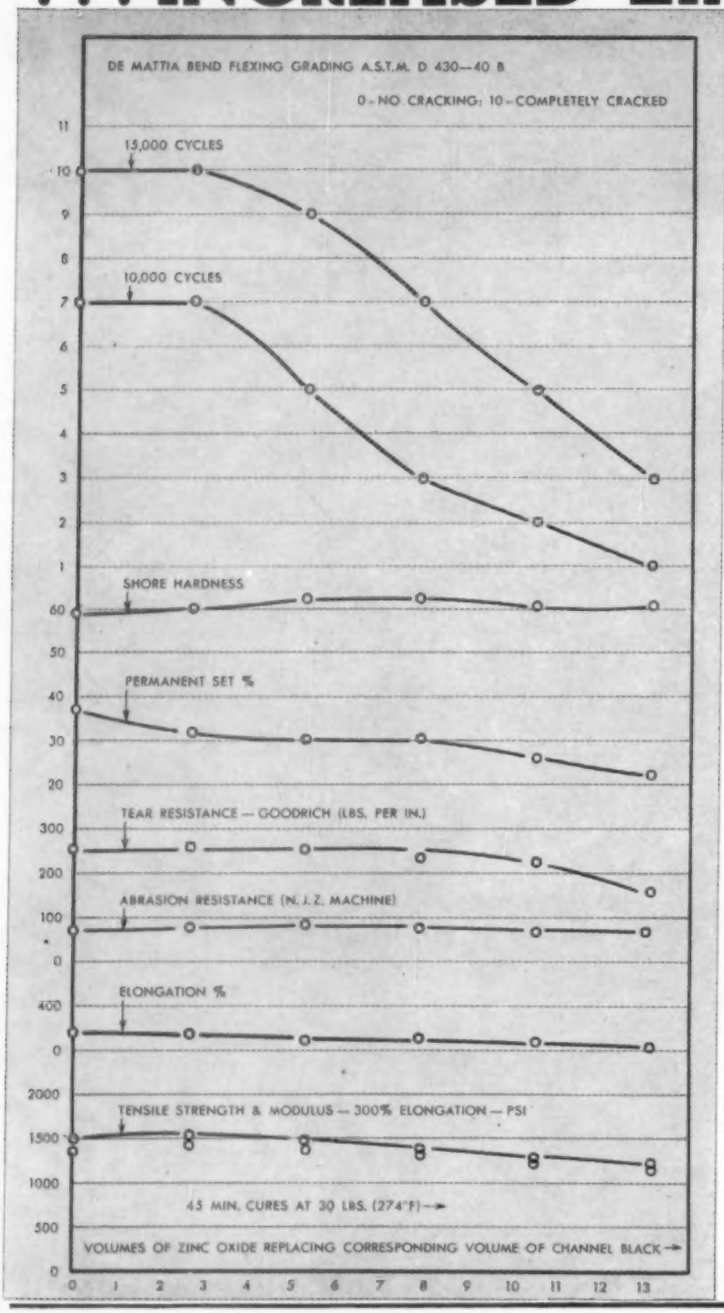
OR-25 has greater low temperature flexibility and is somewhat less oil resistant than OR-15, serving to round out the present line of Hycar synthetic rubbers. The same ease of processing and compounding, characteristic of OR-15, are retained in the new Hycar OR-25.

IMPORTANT NOTICE: Because Hycar OR-25 is a new product, you are permitted under WPB regulations to purchase up to 25 pounds for experimental purposes. Order yours now.

HYCAR CHEMICAL COMPANY

AKRON, OHIO

. . . INCREASED ZINC OXIDE IN ALL-RECLAIM COMPOUNDS


DE MATTIA BEND FLEXING GRADING A.S.T.M. D 430—40 B
0 = NO CRACKING; 10 = COMPLETELY CRACKED
15,000 CYCLES
10,000 CYCLES
SHORE HARDNESS
PERMANENT SET %
TEAR RESISTANCE — GOODRICH (LBS. PER IN.)
ABRASION RESISTANCE (N. J. Z. MACHINE)
ELONGATION %
TENSILE STRENGTH & MODULUS — 300% ELONGATION — PSI
45 MIN. CURES AT 30 LBS. (274°F) →
VOLUMES OF ZINC OXIDE REPLACING CORRESPONDING VOLUME OF CHANNEL BLACK →

In an All-Reclaim compound with 25 parts of channel carbon black per hundred parts of rubber hydrocarbon, such as might be used in an FF tread or recapping stock, the effects of gradually replacing the carbon black with *Horse Head XX Red-4 Zinc Oxide* on a volume basis are shown in the accompanying chart.

Up to 8 volumes replacement with zinc oxide, the tensile strength, modulus, elongation, tear and abrasion resistance and Shore hardness are affected only moderately. The Permanent Set and DeMattia Bend Flexing are improved with each addition of zinc oxide.

The beneficial effects of increased zinc oxide in All-Reclaim *carcass* stocks have been recognized and applied. The present results suggest that increased zinc oxide may also be of value in All-Reclaim *tread* stocks.

COMPOUND						
Whole-Tire Reclaim	193.					
Sulfur	3.25					
"Captax"	1.					
"Laurex"	3.					
Pine Tar	3.					
"B. L. E."	1.					
XX Red-4 Zinc Oxide	0.	16.1	32.2	48.3	64.4	80.5
Channel Black	25	20.	15.	10.	5	0

AMERICAN PROCESS (MADE FROM ORE) ZINC OXIDES ARE READILY AVAILABLE

New Jersey Zinc

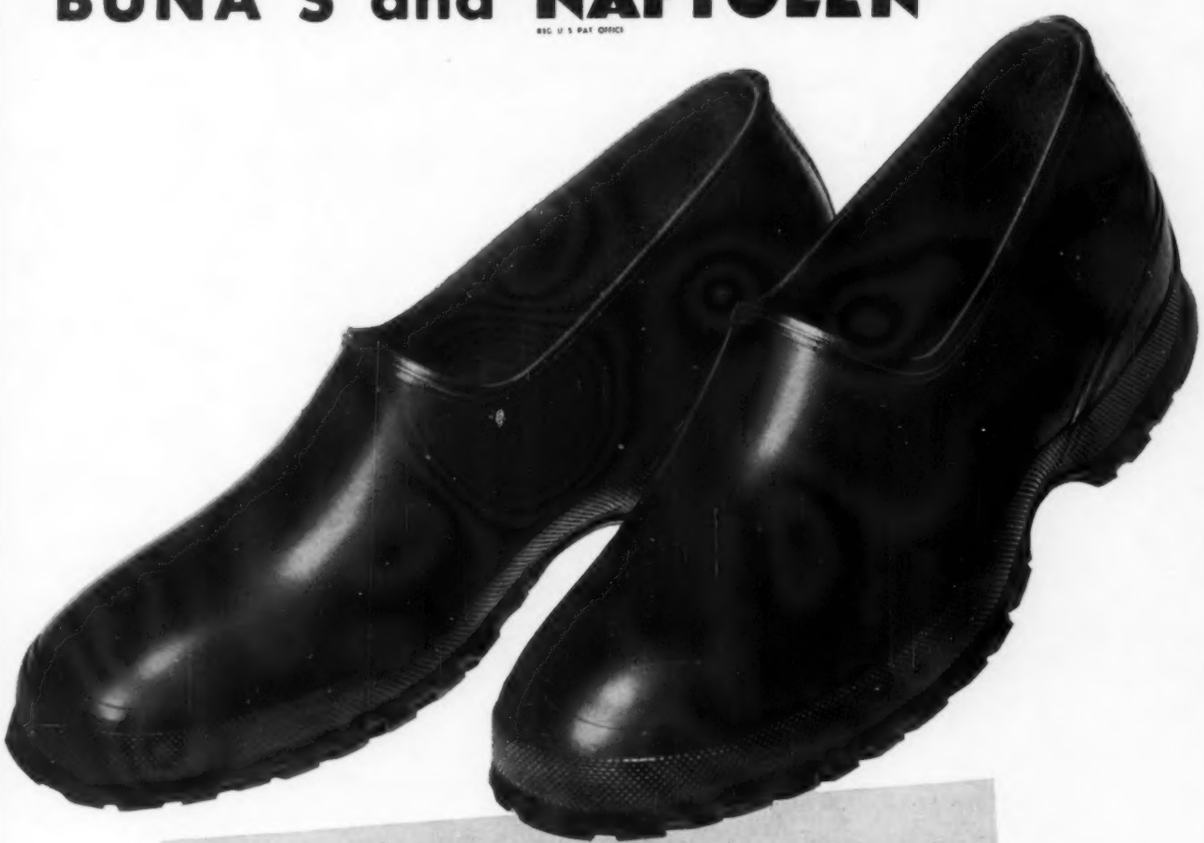
THE NEW JERSEY ZINC COMPANY • 160 FRONT STREET, NEW YORK

UNIFORM QUALITY ZINC OXIDES . . THE HORSE HEAD BRANDS

A Good Pair . . .

BUNA S and NAFTOLEN

REG. U. S. PAT. OFFICE



Thousands of pairs of these GR-S work rubbers have come off the production line at the Goodyear Footwear Corporation's plant, Providence, Rhode Island. This firm, in making Buna S work successfully on a mass production basis, has utilized high proportions of Naftolen to advantage. The outsoles contain 100 parts of Naftolen for every 100 parts of GR-S, while the uppers use 60 parts of Naftolen for every 100 parts of synthetic rubber.

WILMINGTON CHEMICAL CORPORATION

10 East 40th St. — New York, N. Y.

Plant and Laboratory: — *Wilmington, Delaware*

W C C

REG. U. S. PAT. OFFICE

Do You See Spots Before Your Eyes When Examining Your Present Liners?

The CAPITOL PROCESS LINER TREATMENT *prevents those little dabs of rubber from clinging to liners,* causing spoilage of valuable materials and waste of time and money.

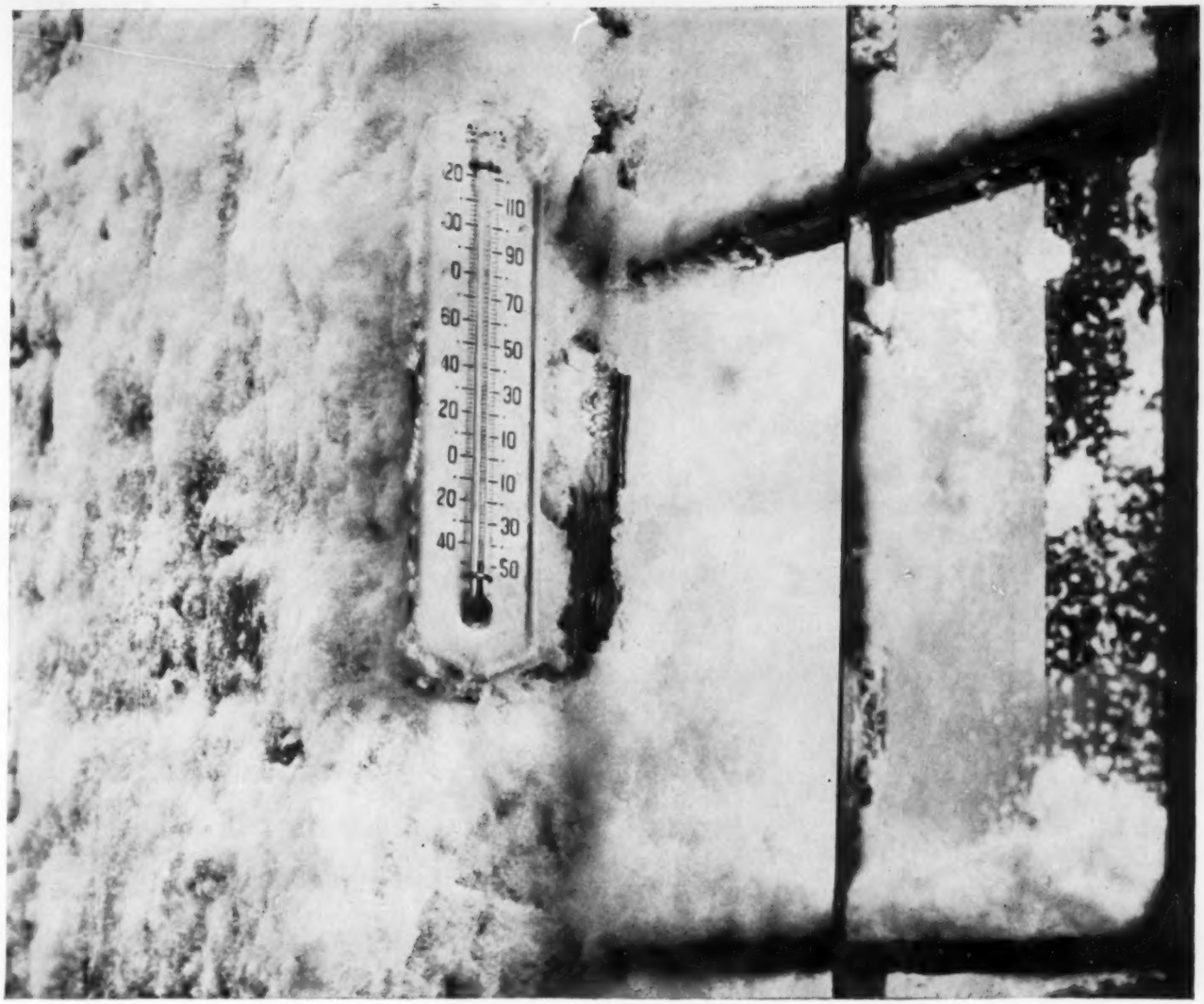
It is a proven process that is steadily winning new friends, because it actually prevents adhesions, accelerates separation and, by preserving the life of cotton fabrics, decreases necessary purchases of new cotton piece goods. It combines effectiveness with economy.

Send us a 50- or 100-yard liner and we will treat it gratis for testing in your own plant. We believe you will like the results.

TEXTILE PROOFERS, INC.

One Gates Avenue — Jersey City, N. J.

Originators of the Capitol Process Liner Treatment



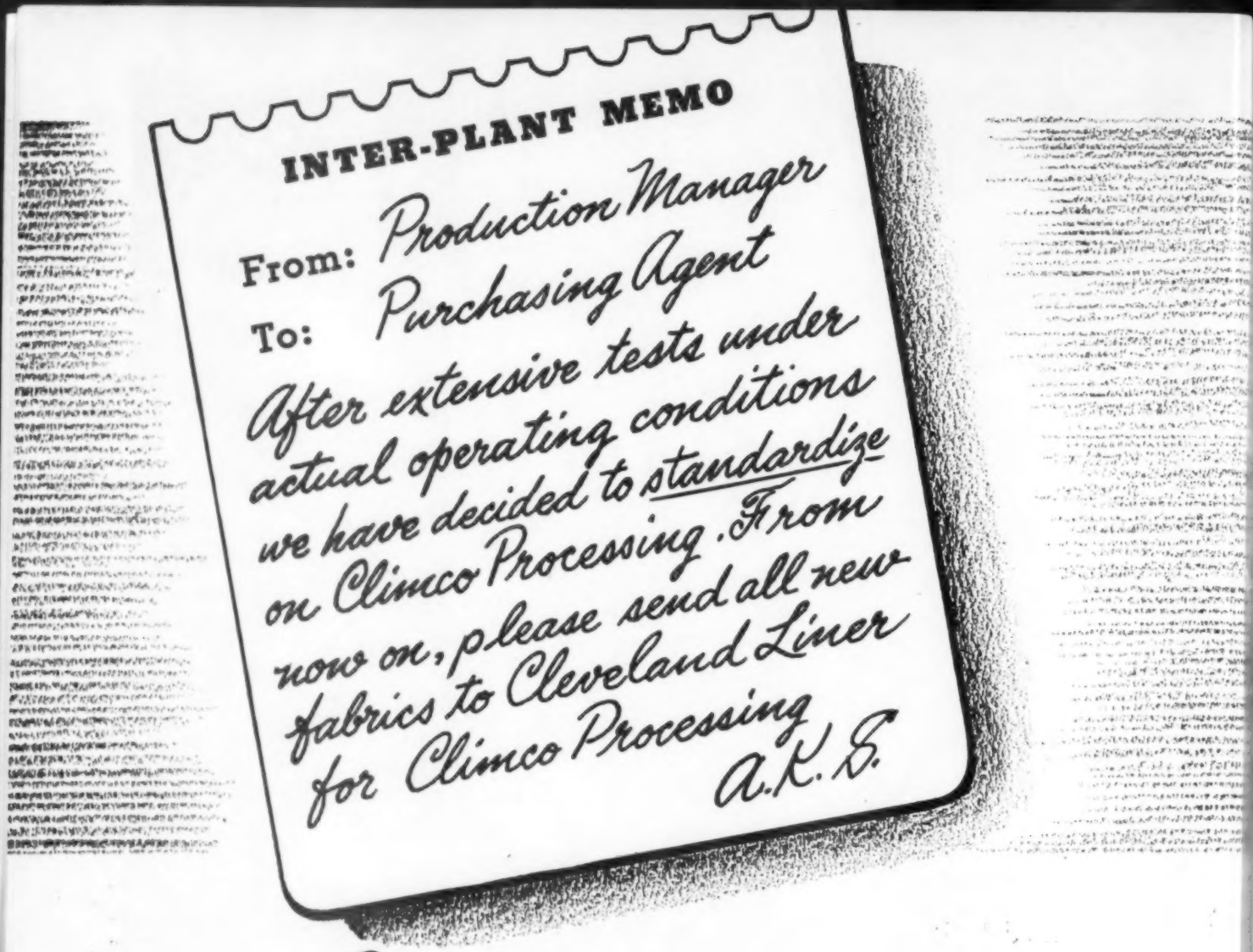
WHEN IT'S COLD AS THE HINGES . . .

PERBUNAN

Perbunan oil-resistant synthetic rubber will stay flexible and hold a firm seal at extremely low temperatures.

Write STANCO DISTRIBUTORS, INC., 26 Broadway, New York City
Warehouse stocks in New Jersey, Louisiana and California

PERBUNAN


INTER-PLANT MEMO
From: Production Manager
To: Purchasing Agent
After extensive tests under actual operating conditions we have decided to standardize on Climco Processing. From now on, please send all new fabrics to Cleveland Liner for Climco Processing
A.K.S.

IT PAYS TO *Standardize* ON CLIMCO PROCESSING

★ In the past 20 years more and more leading rubber companies have standardized on Climco because they have found it soon repays its cost. This tough, yet flexible glaze applied to the liner insures quick, uniform separation, and prevents stock adhesions. Climco Processing also preserves the desired tackiness of the stock, maintains accurate gauge and frees you of the worry of lint and ravelings.

By reducing rejects, Climco Processing prevents the loss of rubber in its crude form. It also greatly lengthens the life of the liner.

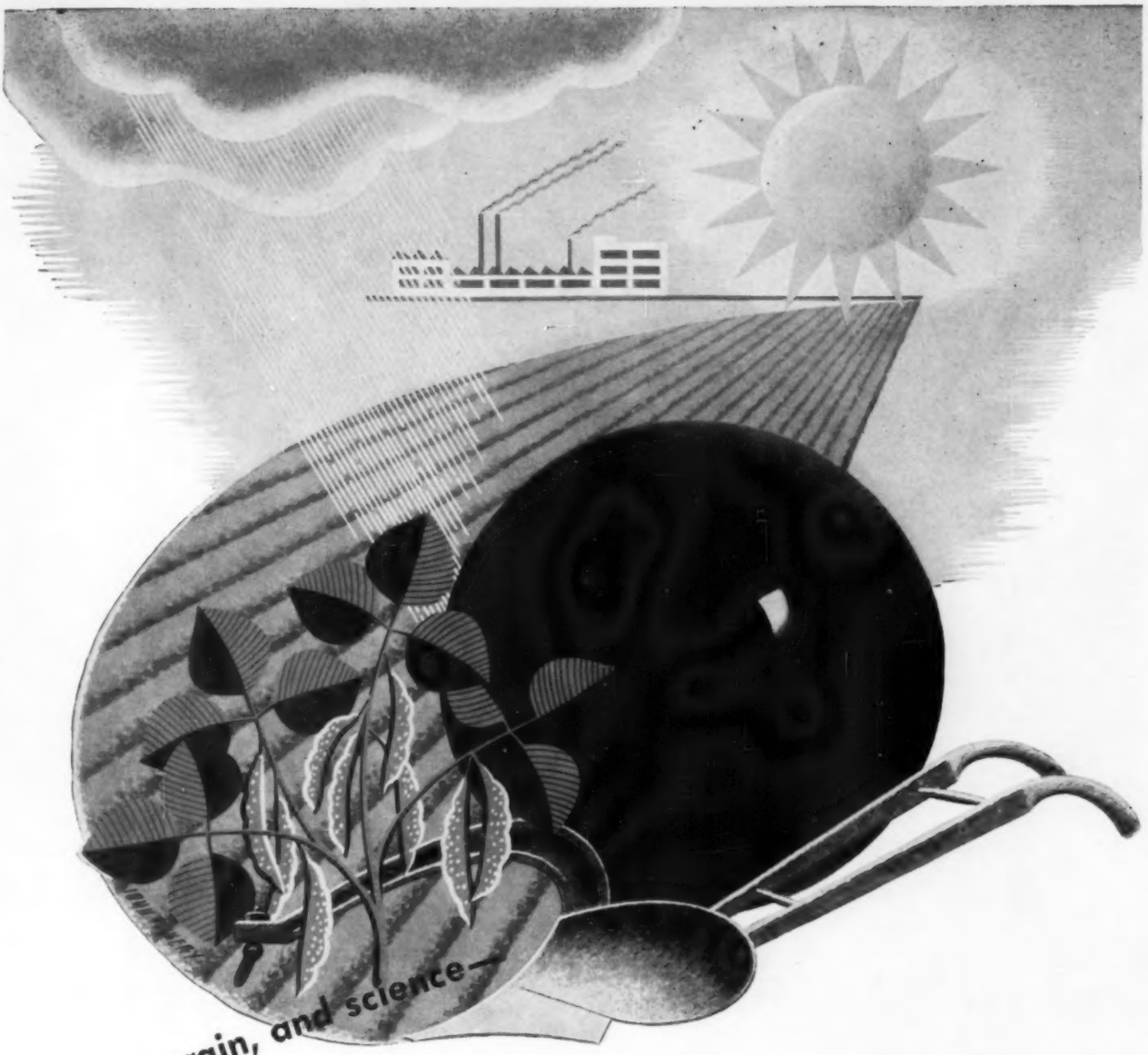
Give Climco Processing a trial in *your* plant under *your* operating conditions, and you will soon decide to standardize on Climco.

THE CLEVELAND LINER & MFG. CO.
CLEVELAND, OHIO

LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO PROCESSED LINERS

FOR FASTER, BETTER PRODUCTION AT LOWER COST



From sun, rain, and science—

. . . TONS OF CHEMURGIC RUBBER

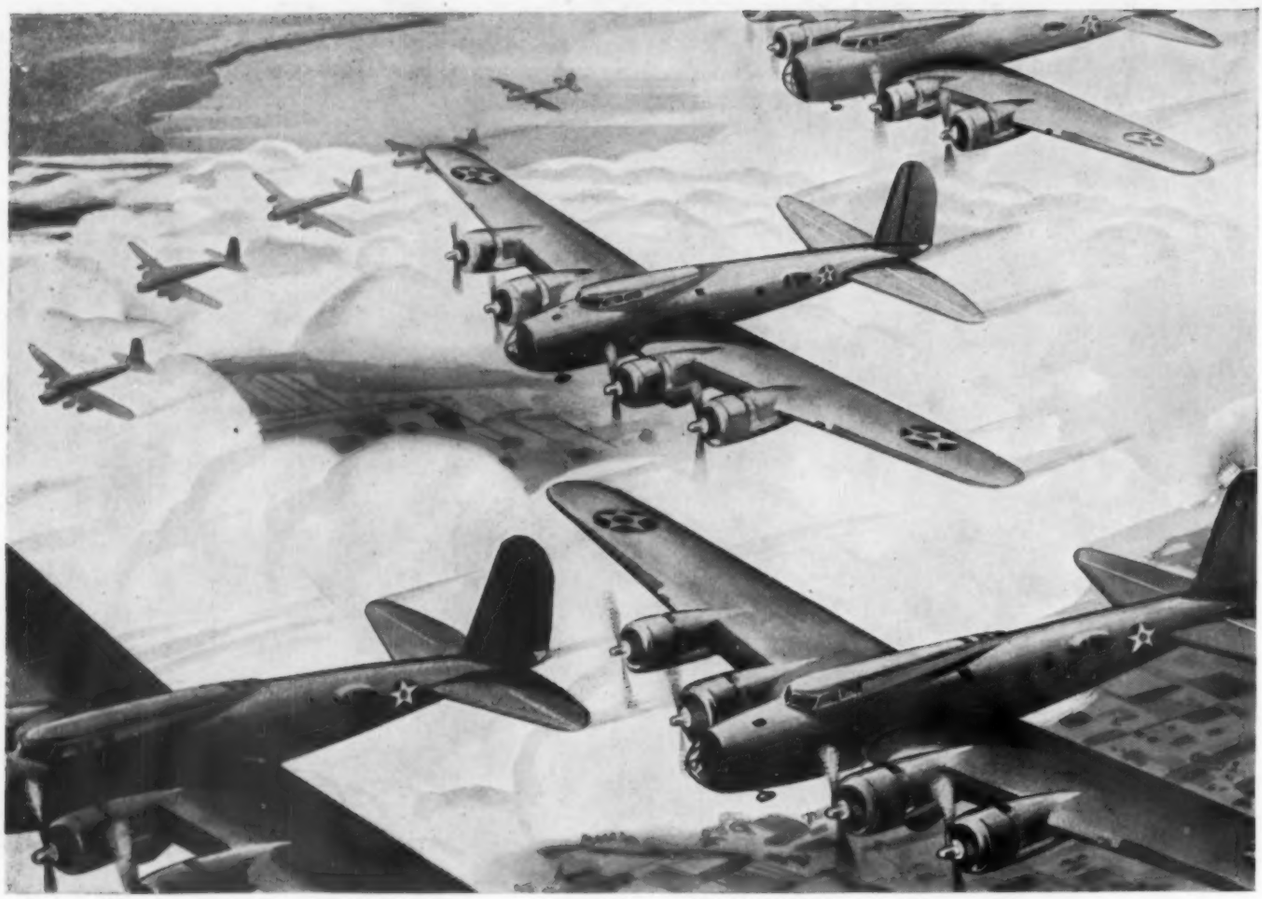
Agripol

RCI

CHEMURGIC RUBBER • INDUSTRIAL PLASTICS • INDUSTRIAL CHEMICALS
CHEMICAL COLORS • SYNTHETIC RESINS

The sun, beating down on limitless acres of bountiful American soil . . . the rain, quickening to life the seeds of easily grown and harvested plants . . . the "know-how" of RCI chemists, skilled in juggling the complex formulae of synthetic compounds—from these wholly native elements has come new, timely and practical relief for America's rubber problem . . . Agripol, the *chemurgic* synthetic rubber. In fact, Agripol, in scores of industrial applications, is *even better than natural rubber*—more resistant to oil and heat, less susceptible to weathering! Already being produced in volume, and capable of being fabricated with existing equipment of rubber goods manufacturers, Agripol is obviously a vitally important material of war. RCI presents it proudly as another contribution to America's victory program.

REICHHOLD CHEMICALS, INCORPORATED
General Offices and Main Plant, Detroit, Mich. Other Plants: Brooklyn, N. Y.; Elizabeth, N. J.; South San Francisco, Calif.; Tuscaloosa, Ala.; Liverpool, England; Sydney, Australia.



IT SHALL BE DONE

All our war effort has brought about many new and difficult problems. You have your share of them—and so have we. Backing away from tough assignments isn't what got either one of us where we are and we're not starting to back-water now!

If you need special technical assistance, say so and we will give. When you need solvents, say *Skellysolve* and you'll get them . . . when you need them . . . where you need them . . . and any quantity within reason.

Our idea of seeing this thing through is for every man to do more than he ever before thought it possible for one man to do. And we know that all America is thinking and doing the same thing. That's why *it shall be done.*

SKELLYSOLVE
in the
RUBBER INDUSTRY

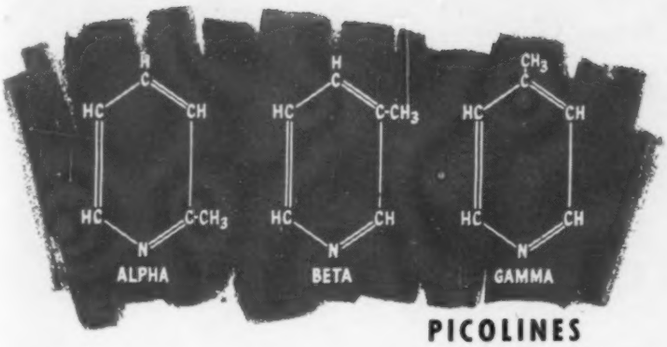
There are six different types of Skellysolve which are especially adapted to various uses in the rubber industry, for making rubber cements, and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. It will pay you to investigate Skellysolve. Write today.

SKELLY

SKELLYSOLVE

SOLVENTS DIVISION, SKELLY OIL CO.
SKELLY BLDG., KANSAS CITY, MO.

Koppers Tar Bases *available*



PICOLINES

Grades Available—alpha picoline distilling completely within 2°C, beta picoline 95% minimum purity, gamma picoline 95% minimum purity.

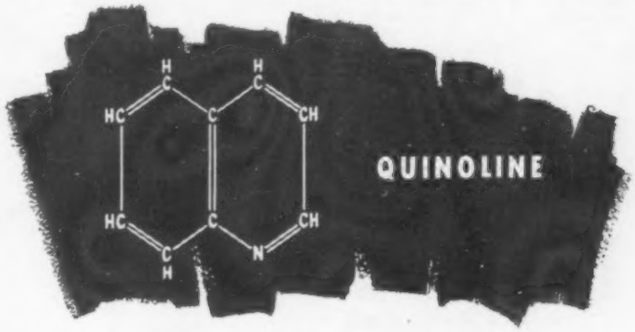
Properties: (Pure Compounds)

	alpha	*beta*	*gamma*
Molecular Weight	93	93	93
Melting Points	−69.9°C.	−18.3°C.	+3.8°C.
Boiling Points	128°C.	143.5°C.	143.1°C.
Specific Gravities at 15°/4°C.	0.950	0.961	0.957

State: Liquid

Solubility: *alpha*-picoline is very soluble and *beta* and *gamma*-picoline are completely soluble in water and form constant boiling mixtures with it. They are all completely miscible with alcohol and with ethyl ether.

Uses: The high water-solubility and the boiling points of picolines recommend them for many solvent uses in place of more expensive solvents, particularly where the use of a pure compound will reduce costs in comparison with wide boiling ranges of unknown compositions. Used in the synthesis of alkaloids, pharmaceuticals and other organic compounds. A starting material in the manufacture of rubber accelerators and anti-oxidants. Beta picoline is a starting material for the manufacture of nicotinic acid and nicotinic acid amide.



Grades Available—Quinoline distilling 95% within 2°C.

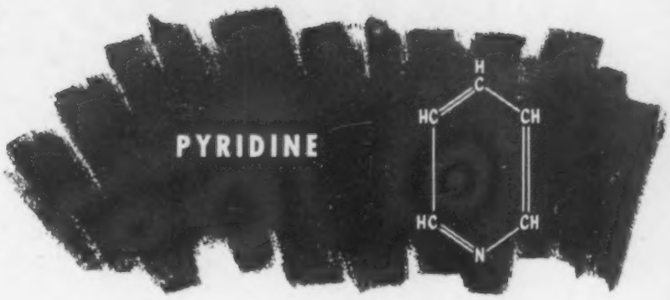
Properties: (Pure Compound)

Molecular Weight	129
Melting Point	−19.5°C.
Boiling Point	237.7°C.
Specific Gravity at 20°/4°C.	1.095

State: Liquid

Solubility: Soluble in alcohol, ether, carbon disulfide and most of the common organic solvents. Partially soluble in water.

Uses: Quinoline is used in the preparation of nicotinic acid, drugs, dyes and photographic sensitizers. Oxyquinoline sulfate is a well known antiseptic. Quinoline is useful as a reaction medium and as an extraction agent.



Grades Available—Pyridine distilling completely within 2°C.

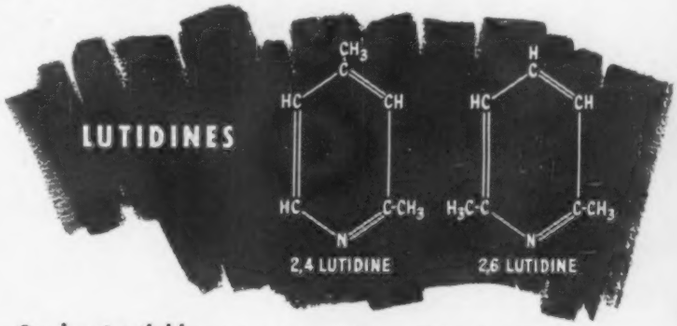
Properties: (Pure Compound)

Molecular Weight	79
Melting Point	−42°C.
Boiling Point	115°C.
Specific Gravity at 25°/4°C.	0.978

State: Liquid

Solubility: Miscible with water, alcohol, ether, benzene and many organic liquids.

Uses: A starting material for production of pharmaceuticals, waterproofing chemicals, rubber accelerators. One of the best solvents for organic materials. Dissolves many metallic salts, forming relatively stable compounds without substitution. Useful in extraction, distillation and purification operations. The wide-boiling pyridines classified as Special and Denaturing grades, also available, can be used for denaturing alcohol and for many other purposes which do not require a large percentage of pure pyridine.



Grades Available—2,4 lutidine distilling 90% within 2°C., —2,6 lutidine 95% minimum purity.

Properties: (Pure Compounds)

	2,6-Lutidine	*2,4-Lutidine*
Molecular Weight	107	107
Freezing Point	−6.0°C.	below −60°C.
Boiling Point	142.9°C.	158.3°C.
Specific Gravity at 25°/4°C.	0.928	0.927
State	Liquid	Liquid

Solubility: *2,6-Lutidine*—very soluble in water and in most organic solvents including alcohols, hydrocarbons, ketones and ethers. *2,4-Lutidine*—soluble to the extent of about 15% in water. Very soluble in most organic solvents such as alcohols, hydrocarbons, ketones, and ethers.

Uses: 2,4 Lutidine is suggested for use in the synthesis of dyes, pharmaceuticals, or other organic chemicals. 2,6 Lutidine is suggested for use in resin, rubber, insecticide, chemical, dye, and pharmaceutical manufacture.

KOPPERS COMPANY

PITTSBURGH, PA.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

THE NATIONAL ROSIN OIL & SIZE COMPANY
AND THIOKOL CORPORATION

Announce

"GALEX*"

(A NON-OXYDIZING RESIN)

a plasticizer

FOR GRS RUBBER (BUNA S)

★ ★ ★

NOW AVAILABLE THROUGH

THIOKOL CORPORATION

TRENTON, NEW JERSEY

MANUFACTURERS OF THIOKOL SYNTHETIC RUBBER AND RUBBER CHEMICALS*

*Thiokol Corporation Trademark Reg. U. S. Pat. Off.
*Reg. U. S. Pat. Off.

It Has Happened!

Interstate Service has meant utmost dependability in Banbury rebuilding for many years . . . .

Now— Because of demands for expanded welding service we have opened a new plant unit for the fabrication of welded metal products —

1. To help meet your problems in fabricating metal products.

2. To build and repair many of your equipment parts.

This new service is offered in addition to our specialized Banbury rebuilding service. Complete new facilities with trained personnel under competent engineering direction are ready now to provide dependable service in this added field.

SERVING THE IWS RUBBER INDUSTRY

INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

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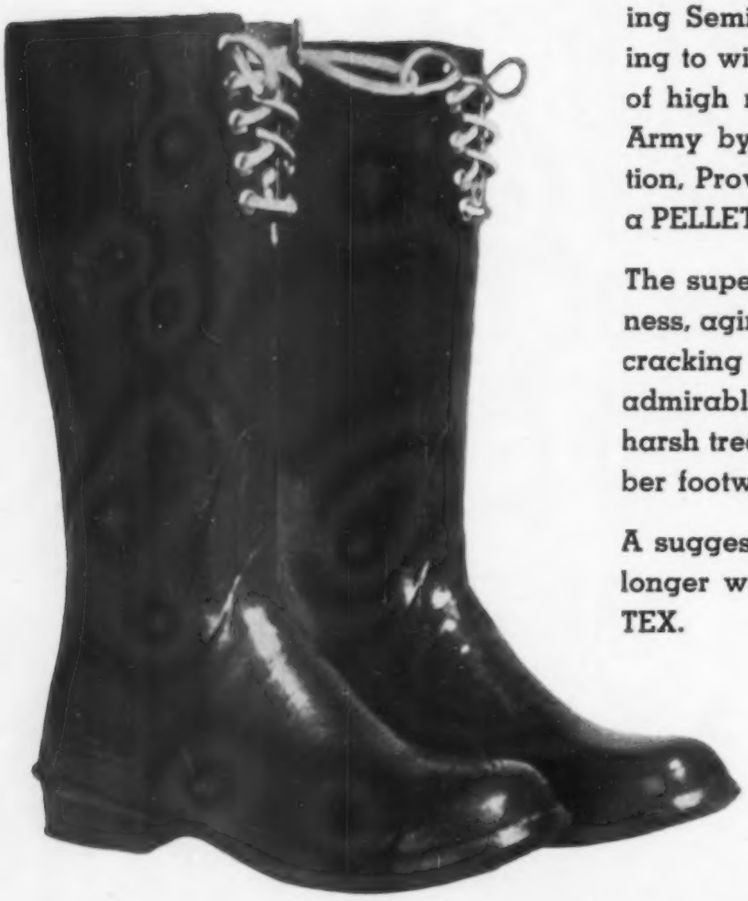

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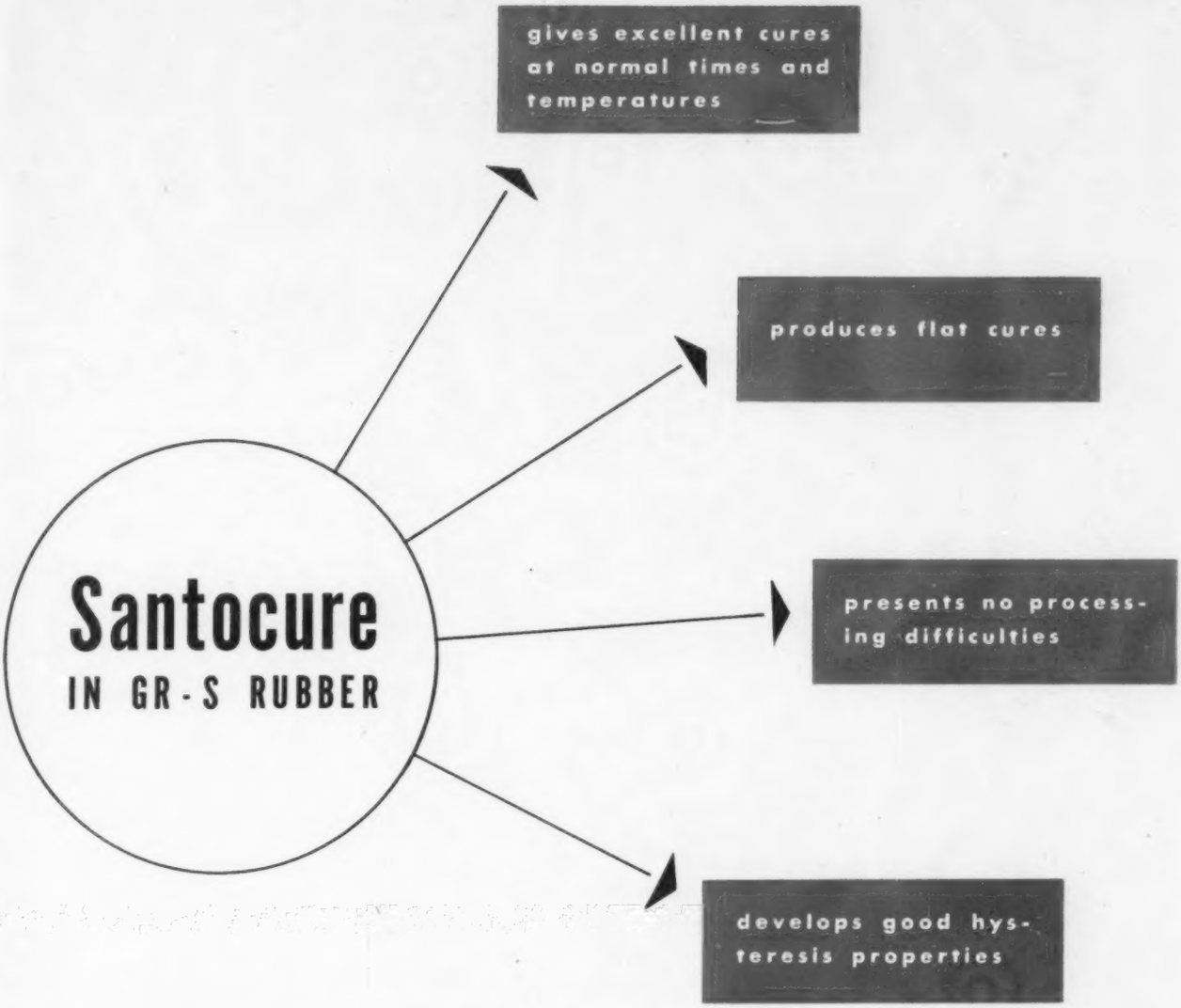

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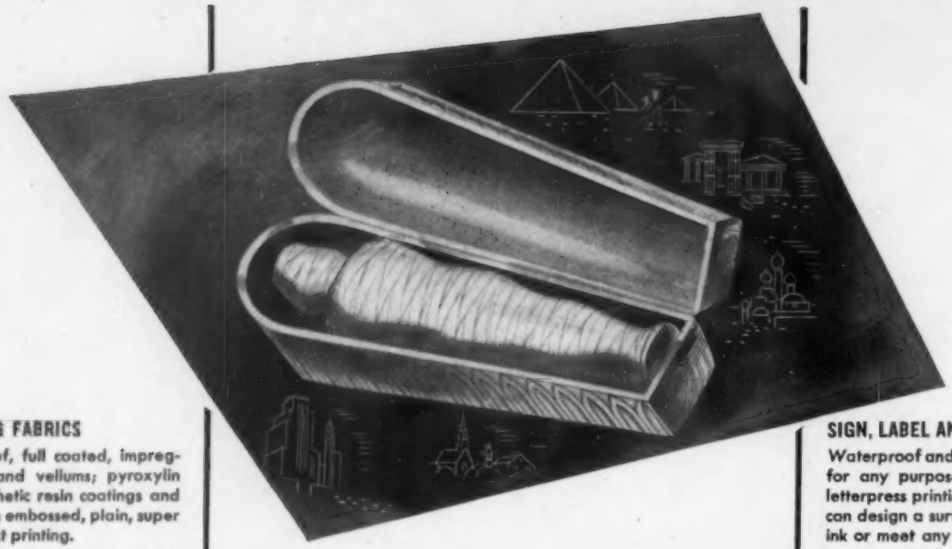

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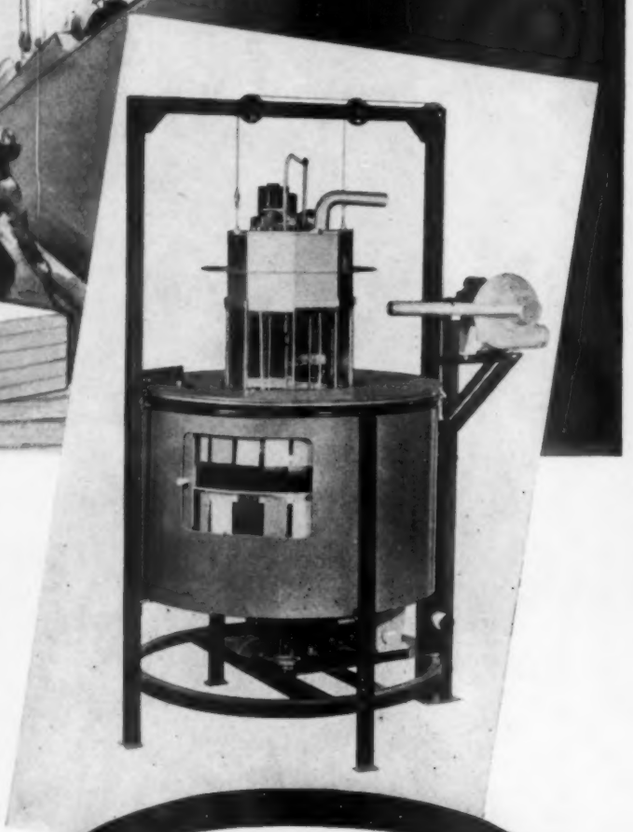

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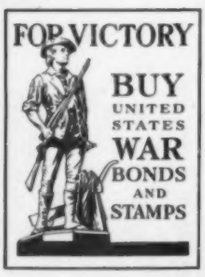

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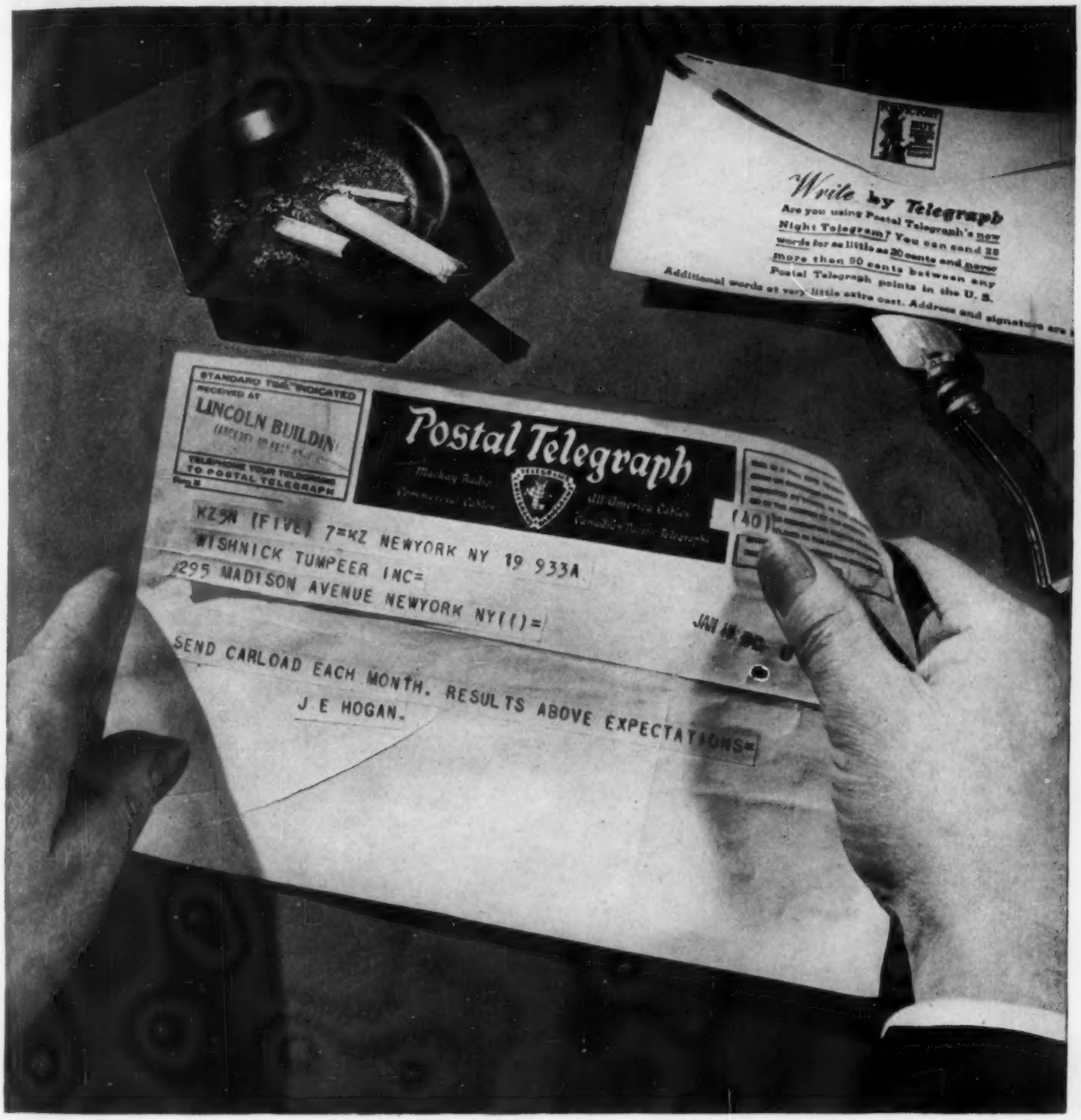
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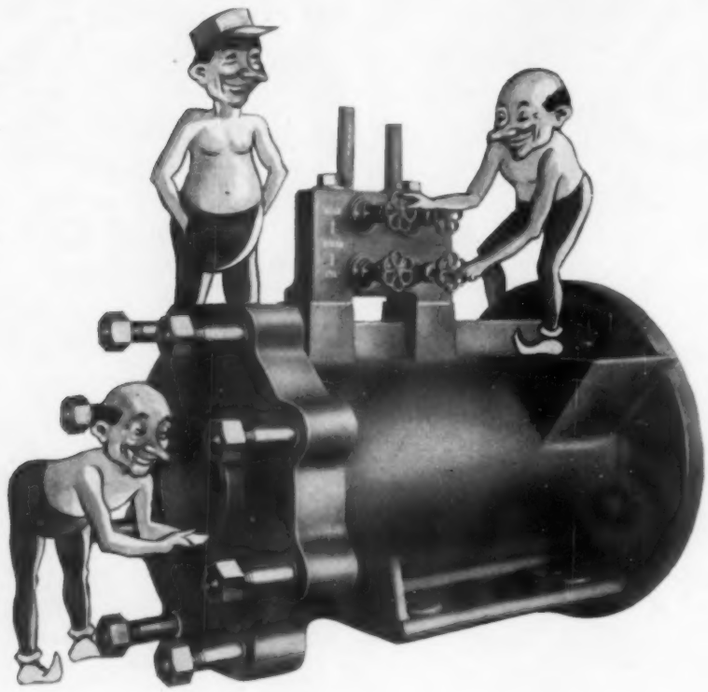

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VOLUME 53
NUMBER 1

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The **RUBBER AGE**

VOL. 53, No. 1 **APRIL, 1943**

The Use of Accelerators in Buna S

By ARTHUR M. NEAL

Assistant Director, Rubber Laboratory,
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BUNA S, now designated as GR-S, is made by interpolymerizing butadiene and styrene in the ratio of approximately 75 parts by weight of butadiene to 25 parts by weight of styrene. It has been shown by Alekseeva and Belitzkaya (*Rubber Chem. and Tech.*, Vol. 15, No. 4, p. 693) that the predominating composition of the polymer is a long chain configuration. Their work indicates that not over 25% of the polymer consists of branched chain macromolecules. They postulate that the long chain macromolecules are about evenly divided between those in which the two components alternate regularly and those in which the two units of styrene interlink adjacently with the styrene pairs separated by one or more molecules of butadiene. In view of the similarity of this structure to that of natural rubber, it is not surprising to find a similarity between the vulcanization and acceleration characteristics of GR-S and those of natural rubber.

Before attempting to discuss the properties of various accelerators in GR-S compounds it appears desirable to discuss briefly, and in general terms, some of the fundamentals of the vulcanization of this polymer. Although some work has been reported in the literature which indicates that GR-S, like natural rubber, may undergo non-sulfur vulcanization, it is probable that normal sulfur vulcanization is the only type which will be widely used commercially.

In view of the fact that even after years of study no completely satisfactory explanation of the vulcanization of rubber was ever developed, it is not surprising to find that we are still working in the dark with respect to fundamental knowledge on the vulcanization and acceleration of GR-S. In spite of a lack of logical correlation and explanation the following facts regarding the vucanization and acceleration of GR-S appear to be emerging.

(1) Sulfur is chemically combined during the vulcanization step.

(2) GR-S is slightly less unsaturated than natural rubber and probably on this account the amount of combined sulfur is generally somewhat lower than is normally found with natural rubber vulcanizates. In spite of this it appears that the range of combined sulfur for proper vulcanization of GR-S is somewhat narrower than it is with natural rubber. We believe that this contraction is shown both at the low and at the high end of the concentration curve.

(3) GR-S vulcanization is more sensitive to a proper balance between sulfur and accelerator concentration than natural rubber.

(4) The vulcanization reactions are more difficult to initiate with GR-S than they are with natural rubber. This leads to greater processing safety with GR-S

Note: This article is based on a paper given by the author before the Chicago Group, Rubber Division, A.C.S., on February 12, 1943.

and also explains why, in general, somewhat higher accelerator concentrations are required.

(5) The shape of the stress strain curve is similar to that for natural rubber. This similarity exists both in the extension and in the retraction curves.

As might be expected, the important accelerators for GR-S appear to be found among the types of known rubber accelerators. A wide search extending over more than a thousand compounds, so selected as to cover nearly all classes of organic compounds, has only served to substantiate this statement. This fact is both a help and a hindrance to the utilization of GR-S. It is helpful because the technologist will be working with chemicals with which he is familiar and even more so because facilities for their manufacture are available and an adequate supply can probably be assured.

Preconceived Notions Dangerous

The difficulties to be anticipated largely revolve around the fact that many of the rubber accelerators act differently in GR-S than they do in natural rubber and it will be absolutely necessary for the technologist *to free himself from all preconceived notions as to their behavior in GR-S.* We feel strongly that one of the greatest dangers to the successful use of GR-S, both from the standpoint of accelerators and from the standpoint of product development, will be a tendency to draw too broad conclusions on limited experimental work as a result of relying too heavily on previous experience with natural rubber.

In spite of the dangers involved we believe that it is possible to classify broadly the properties of the various types of accelerators when used in GR-S. Although the following generalities cannot be considered to be without exception they are based upon a sufficient number of tests to indicate their probable truth.

(a) *The Basic Type Accelerators*:—The most important members of this class are the guanidines and the wide variety of aldehydeamine accelerators. In general, this whole class of compounds are very weak accelerators for GR-S. Some of the more active types of aldehydeamines, *e.g.* Accelerator 808, show sufficient activity when used in high concentrations (over 2%) to indicate that they may find utility in special cases since they appear to give somewhat improved tear resistance and higher ultimate elongations. In spite of their deficiencies as primary accelerators the basic accelerators do show considerable promise as secondary accelerators or accelerator activators for use with either the acidic type accelerators or with the thiuram accelerators.

(b) *The Acidic Type Accelerators*:—We are including in this class not only the thiazoles and the thiazolines but also their derivatives, which, strictly speaking, are not acidic type accelerators. This class of accelerators appear destined to play an important role in the acceleration of GR-S just as they have in natural rubber. It is quite probable that the major use of these accelerators will involve their use in combination with a secondary accelerator or accelerator activator. The use of such combinations appears to offer even greater advantages than can be outlined with the self activated types, such as Acrin or the benzothiazyl sulfenamides. Some of the differences between the action of accelerators in GR-S and in natural rubber are shown by this class of accelerators. The thiazolines, *e.g.* 2-MT, appear to be very desirable accelerators for GR-S. Acceleration with 2-MT, or better still with combinations of 2-MT and Accelerator 808, leads to vulcanizates with exceptionally low heat build-up.

(c) *The Thiuram Accelerators*:—In this class of accelerators we are including the thiuram monosulfides, disulfides and polysulfides. This class of accelerators appears to be outstanding for use in GR-S. Of the entire class the thiuram monosulfides, *e.g.* Thionex, are preeminent. Thionex serves as an excellent example of the differences between the action of an accelerator in GR-S and in natural rubber and illustrates vividly the dangers of attempting to rely upon a background in natural rubber for problems arising with GR-S. The outstanding difference between the action of Thionex in GR-S and its action in natural rubber is that it does not overcure readily and there is little change in modulus, tensile strength or elongation at break, even on prolonged curing. Although Thionex stocks vulcanize rapidly at curing temperatures, they are relatively inactive at processing temperatures and no danger of scorching arises from their use.

The thiuram disulfides, *e.g.* Thiuram M, are somewhat more active at low temperatures than Thionex but do not appear as promising for general use as the latter. The thiuram polysulfides, *e.g.* Tetrone A, appear to be the most active of the thiurams at low temperatures and will undoubtedly find special uses in GR-S. The entire class of thiuram accelerators is susceptible to activation and some of the most attractive accelerators for GR-S seem to lie in combinations of accelerators including a thiuram as one component.

(d) *The Dithiocarbamate Accelerators*:—Two types appear to have some interest in GR-S; they are the metal salts, *e.g.* zinc diethyl dithiocarbamate, and the substituted ammonium salts, *e.g.* Accelerator 552. The dithiocarbamates are extremely active accelerators in GR-S. In fact, their activity will probably prevent their general use since they tend to produce scorchy stocks. They will probably find limited applications where low temperature cures are necessary and also in small concentrations as activators for other accelerators.

Criteria of Accelerator Value

Before discussing in detail the results obtainable in GR-S vulcanizates through the proper selection of accelerators, it may be profitable to consider broadly what one expects to accomplish in the vulcanization of an elastomer by the use of an accelerator. As has been pointed out previously *(Rubber Age*, Vol. 46, No. 5, p. 289, 1940), in the case of natural rubber the chief criteria of the value of an accelerator have been the properties of the vulcanizates obtainable by their use. With such a background it is reasonable to expect that the same criteria of utility will be applied to the selection of accelerators for use with GR-S.

From a physical chemical standpoint the vulcanization reactions involved in the curing of an elastomer are reactions which carry the system from a lower to a higher state of entropy. For the term "entropy" we may substitute "stability" and not affect the general meaning appreciably. One may conceive of these reactions pictorially by imagining a chest with a whole series of drawers, each open a little bit more than the one above. Each drawer might be labeled with an appropriate description of properties; thus, one might

be labeled tear resistance, another heat resistance, a third age resistance, a fourth abrasion resistance, a fifth resiliency, etc.

If one conceives of the natural rubber system before vulcanization as existing in somewhat unstable equilibrium on the top of the chest of drawers, it is possible to conceive of the accelerators for natural rubber as being those materials which deflect the system off the top of the chest of drawers with just the right force to make it land in the preselected drawer containing the properties that are desired. With GR-S, however, the system on the top of the chest of drawers is in much more stable equilibrium and it requires a greater force to start it on its descent. It is therefore much more difficult with our present knowledge to find accelerators which will displace the GR-S system with just the right force to make it land in the predetermined drawer.

Developing Special Properties

In spite of these inherent difficulties it has been found possible through the proper selection of accelerators to develop special and in some cases unusual properties in GR-S vulcanizates through the proper selection of accelerators. Before presenting the actual data it should be emphasized that these data were accumulated on various lots of GR-S, practically all of which came from pilot plants of the various manufacturers. In view of this fact there has been considerable variation in curing properties and while we are certain that the results discussed are broadly true, too much reliance cannot be placed upon the absolute values for any of the physical properties mentioned.

Physical properties such as tensile strength, hardness, tear resistance, etc., are markedly influenced by the choice of accelerators, and thiuram accelerators are outstanding in developing these properties. In view of the well known fact that GR-S compounds have very poor physical properties unless compounded with channel carbon black, a stock containing 50.0 parts of black was used as a base. The best properties seem to be given by Thionex as is shown by the data on the following compound:

GR-S	100.0
Stearic Acid	1.0
Channel Black	50.0
Zinc Oxide	5.0
Sulfur	2.0
Thionex	0.5

TABLE I

Cure min.	Cure °F.	Stress at 400% Elong. psi.	Tensile Strength psi.	Elong. at Break %	Hardness Shore	Tear Resistance 82°F.	Tear Resistance 70°C.	Heat Build-Up °C.
60	227	....	25	610	..	...	...	..
30	274	1825	3375	590	67	...	...	..
45	274	2275	3250	510	68	240	..	..
60	274	2400	3250	485	69	240	250	64
90	274	2575	3275	475	69	195	215	58

It will be noted from these results that, although this stock has remarkable processing safety as is shown by the essential lack of cure in 60 minutes at 227°F., nevertheless it cures very rapidly at 274°F. Another outstanding feature of thiuram accelerators which is illustrated by this stock is the retention of modulus, tensile strength and elongation at break on prolonged cure. Attention should also be drawn to the fact that although the tear resistance at 82°F. is relatively low as compared with rubber, nevertheless it compares favorably with any tear resistance so far found for GR-S stocks and the tear resistance is maintained when measured at 70°C. to a much higher degree in this Thionex accelerated stock than is usual with other types of accelerators.

For certain types of products it is often desirable to vulcanize at temperatures below 274°F. In spite of the difficulties of initiating vulcanization reactions in GR-S it is possible, by the proper choice of accelerators, to produce stocks which are suitable for curing at temperatures considerably below 274°F. The following stock which is representative of a type which might be used in the production of boot and shoe stocks illustrates the type of accelerator required:

GR-S	100.0
Semi-reinforcing Carbon Black	120.0
Carbonex S	15.0
Naftolen R-100	15.0
Zinc Oxide	5.0
Sulfur	3.0
Thionex	0.5
MBTS	0.5

TABLE II

Type of Cure	Cure Time min.	Cure Temp. °F.	Stress at 100% Elong. psi.	Tensile Strength psi.	Elongation at Break %
Press	60	227	....	50	520
Hot Air—one hour rise to 260° F. plus time indicated	30	260	1050	1600	206
	60	260	1250	1625	160
	90	260	1375	1675	145

This stock also has a very marked degree of processing safety as indicated by the cure at 227°F. Contrary to the case with natural rubber, it appears that MBTS when used in combination with Thionex in GR-S stocks has the property of increasing processing safety while at the same time activating the cure at slightly elevated temperatures. It will be noted that the elongations at break are very low. In order to make a practical stock for use in boots and shoes it would be necessary either to increase the amount of softener used in the stock or to change the type used. Such changes will not affect the vulcanizing characteristics of the MBTS-Thionex combination but will produce vulcanizates having considerably greater elongations at break, somewhat lower stress at intermediate elongations and an ultimate tensile strength approaching that shown in the table. It will be noted that this stock designed for curing at lower temperatures has a higher sulfur content than the base stock discussed above. This is an example of the fact stated earlier in the article that a proper relationship between sulfur concentration and accelerator concentration is extremely important in GR-S vulcanizates.

Fast Curing GR-S Stock

Perhaps the fastest curing GR-S stock which we have developed is one in which the accelerator combination consists of a mixture of Thionex and Accelerator 5 (anhydro formaldehyde aniline), as follows:

TABLE III

GR-S	100.0
Stearic Acid	1.0
Channel Black	50.0
Zinc Oxide	5.0
Sulfur	2.0
Accelerator 5	2.0
Thionex	0.5

Cure: 45 min. at 227° F.

Stress at 400% (psi.)	Tensile Strength (psi)	Elongation at Break (%)	Hardness Shore
1350	2850	640	64

This combination appears to be so rapid curing that difficulty could be anticipated in trying to process it. It is suggested that such an accelerator combination might prove extremely valuable in the development of a self-curing cement.

In the development of certain types of products, for example insulated wire, it is necessary to develop GR-S compounds which will cure very rapidly at unusually high temperatures. Such stocks can be produced through the combination of Thionex-Tetrone A and 2-MT as illustrated by the following formula:

GR-S	100.0
Stearic Acid	1.0
Neozone A	2.0
Heliozone	2.0
Precipitated Whiting	50.0
Natural Clay	50.0
Whiting	50.0
Mineral Rubber	30.0
Zinc Oxide	15.0
Litharge	0.25
Sulfur	3.0
Thionex	0.25
Tetrone A	0.25
2-MT	0.50

TABLE IV

Type of Cure	Cure: Time min. or sec.	Cure: Temp. °F.	Stress at 400% Elong. psi.	Tensile Strength psi.	Elong. at Break %	Hardness Shore
Press	30′	274	225	775	910	49
	60′	274	425	1050	630	56
C. V. 3/64" Insulation on #14 wire open steam	15"	388*	250	500	610	..
	18"	388	275	650	635	..
	20"	388	300	800	670	..
	22"	388	275	900	650	..
	24"	388	300	950	650	..
	28"	388	425	1050	660	..

* Equivalent to 200 psi. steam pressure at sea level.

In spite of the rapid rate of cure of this stock at high temperatures it has excellent processing safety. Laboratory tests indicate that it requires 21 days' storage in a 50° C. oven before the stock is set-up to the extent that it can no longer be processed. After 16 days' storage in the same oven the stock is still in a processable condition. The rate of cure shown by this GR-S stock compares favorably with the rate of cure of natural rubber stocks developed over the past years for use in C. V. insulation.

It should be emphasized that the stock given above does not represent the ultimate in the production of an insulated wire stock. Somewhat higher physical properties might be obtainable through the use of different types or amounts of fillers and softeners. It is, however, representative of a type which can be used in the insulated wire field and the conclusions with respect to its acceleration are undoubtedly broadly applicable to any type of wire stock.

One of the serious deficiencies of GR-S vulcanizates has been their lack of resiliency as shown by a high heat build-up on repeated flexing. The property of resiliency can be markedly altered through the proper selection of accelerators. The following stock in which the acceleration is a combination of 2-MT and Accelerator 808 is outstanding in producing a stock having a low heat build-up as measured by the test on the Goodrich Flexometer:

GR-S	100.0
Soft Carbon Black	30.0
Channel Black	15.0
Zinc Oxide	5.0
Sulfur	2.0
2-MT	1.25
Accelerator 808	0.20

TABLE V

Cure 274° F. min.	Stress at 400% Elong. psi.	Tensile Strength psi.	Elong. at Break %	Hardness Shore	Tear Resis. psi.	Tests at 70° C.: Tensile Strength psi.	Tests at 70° C.: Tear Resis. psi.	Heat Build-Up °C.
30	745	2450	730	..	....	....	....	..
45	1025	2700	655	56	110	1075	120	..
60	1225	2400	585	57	125	975	120	..
90	....	....	..	..	....	....	....	33

The stock used in this illustration is typical of a base recipe which would be used in a tire carcass. The heat build-up given in the table on the 90 minute cure was determined after 20 minutes on the Goodrich Flexometer operating with a 1/8-inch stroke and 150-pound load. The pellet cure of 90 minutes is approximately equal to a slab cure of 75 minutes. Using the same stock but changing from a combination of 2-MT and 808 to thiuram or thiazyl disulfide acceleration will result in a heat build-up of about 45°C. under the same conditions of test.

Unquestionably a great deal of additional work will be necessary in order to completely replace natural rubber with GR-S. It is becoming more and more evident, however, that accelerators will play an important role in solving many of these problems just as they did in the development of natural rubber products. Although many of the accelerators and accelerator combinations behave differently in GR-S than they do in natural rubber, nevertheless the properties of GR-S vulcanizates can be altered by their use. In view of this fact the rubber technologist should face the future with confidence that it can produce no problems respecting the use of GR-S which he cannot solve.

Thiokol TP-90—A Low Temperature Plasticizer

A NEW non-volatile plasticizer for Thiokol Type FA and the butadiene copolymers has been introduced by the Thiokol Corp., Trenton, N. J. Called Thiokol TP-90, the new material is a high boiling, low freezing organic liquid with a specific gravity of 1.04. Compounds containing the new plasticizer are said to retain their flexibility at low temperatures and to show excellent resistance to shattering on firing tests.

A typical compound, consisting of Thiokol FA (100), zinc oxide (10), semi-reinforcing black (70), sulfur (1.0), stearic acid (0.5), benzo-thiazyl-disulfide (0.3), D.P.G. (0.1), and TP-90 (15), cured for 50 minutes at 298° F., indicated a modulus of 880 at 300%, a tensile of 975, elongation of 360%, and a Shore hardness of 62.

Low temperature flexibility of this compound was measured by mounting strips 4x1/4x1/16-inch in the form of loops over a 3/4-inch square cross section board, the samples being placed in a gasoline bath cooled by dry ice. After one-half hour in the batch, the sample was pinched together by hand, using a heavy oil-proof glove to protect the hand. This compound remained flexible at —50° F., became stiff at —60° F., and broke at —70° F.

Galex as a Plasticizer for GR-S (Buna S) Stocks

By JULIAN PANEK

Development Dept.,
Thiokol Corporation,
Trenton, N. J.

GALEX is a non-oxidizing rosin. It is an amber colored solid having a melting point of 150° F., a specific gravity of 1.06, and an acid number of 154 to 159. It is manufactured under controlled conditions and held to rigid standards of uniformity.

This report outlines the behavior of Galex in GR-S (Buna S) compared with two standard coal tar softeners as regards curing characteristics, stress-strain properties, tensile strength, elongation, and flexing characteristics. The study also includes stocks containing as high as 40 parts of Galex on 100 parts of GR-S which show good tensile strength, high elongation, and good frictioning characteristics.

A considerable number of plasticizers have been tested and of these Galex imparts the greatest tack to GR-S compounds. This is particularly noticeable when the compound is washed with a solvent such as naphtha.

Galex in a Tread Type Compound

A. *Effect on Physical Properties:* The series of stocks in Table I show the effect of Galex in a tread type compound compared with two standard type coal tar softeners, and compared with a stock containing no plasticizers. These data cover plasticity of the raw stock, tensile strength, elongation, 300 and 500% modulus, and hardness for a series of cures.

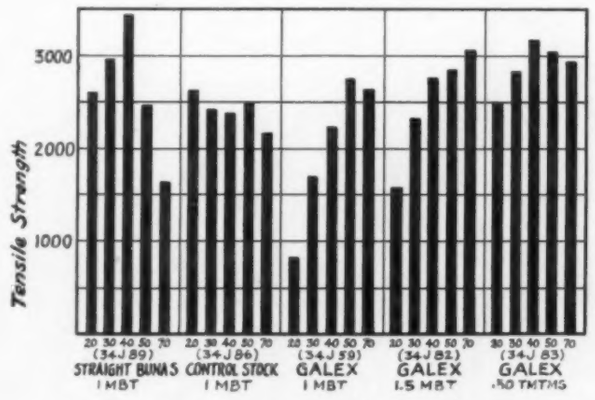

FIG. 1—*Tensile Strength vs. Cure.*
(Cure at 298° F.; 10 parts plasticizer)

Note: The name "Galex" is registered at the U. S. Patent Office.

TABLE I

		34J89	34J86	34J59	34J82	34J83	34J145
Buna S		100.	100.	100.	100.	100.	100.
Zinc Oxide		5.	5.	5.	5.	5.	5.
Sulfur		2.	2.	2.	2.	2.	2.
Soft Channel Black		40.	40.	40.	40.	40.	40.
MBT (a)		1.	1.	1.	1.50	..	..
DOTG		.20	.20	.20	.20	..	..
TMTMS (b)		..	..	..	..	.50	.35
Stearic Acid		2.	2.	2.	2.	2.	2.
Galex		..	..	10.	10.	10.	..
Coal Tar softener		..	10.	..	..	..	10.
Plasticity		.178	.145	.128	.139	.133	.141
Cure at 298° F. & 280° F.							
Tensile	20 38	2600	2640	840	1570	2500	2810
	30 57	2970	2420	1700	2320	2820	2690
	40 76	3420	2360	2220	2760	3180	2600
	50 95	2460	2500	2750	2850	3030	2700
	70 153	1620	2180	2630	3050	2940	2520
Elongation	20 38	660	690	950	880	770	600
	30 57	590	620	910	800	710	580
	40 76	590	600	820	750	700	570
	50 95	430	610	780	710	690	580
	70 153	320	550	670	660	670	560
Mod. 300	20 38	720	680	160	300	610	790
	30 57	1020	740	200	440	680	830
	40 76	1200	750	400	590	800	870
	50 95	1360	770	500	630	800	870
	70 153	1540	880	610	810	800	900
Mod. 500	20 38	1750	1420	350	650	1360	1880
	30 57	2420	1630	690	1040	1580	1970
	40 76	2880	1720	970	1380	1860	2020
	50 95	....	1750	1240	1520	1850	2020
	70 153	....	1920	1440	1950	1850	2120
Duro. (Shore)	20 38	57	61	45	51	56	61
	30 57	60	63	49	54	59	62
	40 76	61	64	51	56	60	62
	50 95	62	65	52	58	60	63
	70 153	63	66	53	60	60	64

(a) Mercaptobenzothiazole; (b) Tetramethyl-thiuram-monosulfide.

The plasticity index is the height in inches of a pellet originally ½-inch in diameter and ½-inch in height after 10 minutes in a Williams Plastometer at 158° F.

For the physical tests, the stocks were cured at 298° F. The corresponding cures at 280° F. have been computed according to the formula put out by the Office of the Rubber Director. These are included in an adjacent column. The durometer reading was taken after two seconds contact.

The comparisons of tensile strength vs. cure, and per cent elongation vs. cure, for stocks 34J86, 34J89, 34J59, 34J82, and 34J83 are shown in Figs. I and II. Because stocks containing Galex cure at a slower rate than the control, a TMTMS stock, which cures at approximately the same rate as the control, has been included.

From the data in Table I and Figs. I and II, the following general conclusions can be drawn.

1. Galex in a tread type compound greatly improves elongation. At the same time, the tensile strength is improved.

2. The elongation of compounds containing Galex is better than the control in stocks having comparable cure.

3. Galex gives slower curing compounds than do the coal tar softeners.

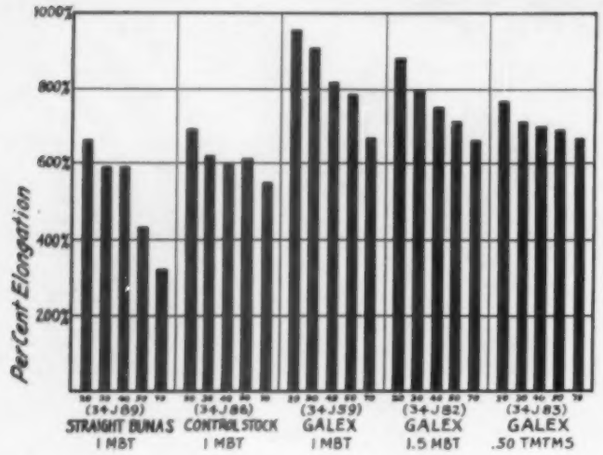

FIG. 2—*Elongation vs. Cure.*
(Cure at 298° F.; 10 parts plasticizer)

4. Galex softens GR-S to a greater extent than do the standard coal tar softeners.

B. *Effect on the Resistance to Cut Growth:* The fact that GR-S compounds show poor resistance to cut growth is a recognized weakness of this polymer. That Galex definitely improves the cut growth resistance is demonstrated in Fig. III.

In determining this value, DeMattia test strips were given a series of cures. Before mounting in the machine, the strips were nicked .01 inches on each side, using a sharp razor blade. The strips were then flexed and the number of flexes required for the cuts to grow across the surface of the test strip determined.

In Fig. III are given the resistance to cut growth of the stocks shown in Table I. The relative heights of the various columns are an index to the cut growth resistance of the compounds. Note should be made of the fact that the stocks containing Galex were cured as long as 90 minutes at 298° F. which is decidedly well towards an overcure. Even when cured this long, the cut growth resistance is superior to a low cure of the control stock.

Increased Loading of Galex

In order to get the best properties out of compounds containing Galex, the accelerator-sulfur ratio should be varied as the amount of Galex is increased. The stocks shown in Table II were selected from a number of compounds wherein different ratios were tried. They represent compounds showing optimum properties for a given loading of Galex.

The resistance to cut growth increases as the amount of Galex is increased. The 34J150 stock containing 40 parts of Galex was flexed 90,000 times. After this time, the small cuts in the test sample had not increased appreciably.

Heat Build-up of Galex Stocks

The heat build-up in a Goodrich Flexometer on stocks containing coal tar plasticizers or Galex show no difference. At this time, our results indicate that Galex is more or less neutral on the heat build-up characteristics of stocks containing it.

TABLE II

			34J104	34J105	34J107	34J150	34J173
Buna S			100.	100.	100.	100.	100.
Zinc Oxide			5.	5.	5.	5.	5.
Sulfur			2.	2.	2.	2.50	2.
Soft Channel Black			40.	40.	40.	40.	40.
MBT (a)			..	..	..	..	1.
DOTG			..	..	..	..	.20
TMTMS (b)			.50	1.	1.	1.	..
Stearic Acid			2.	2.	2.	2.	2.
Galex			20.	20.	30.	40.	..
Coal Tar Softener			..	..	..	..	40.
Plasticity			.138	.147	.131	.107	.126
Cure @ 298°F. & 280°F.							
Tensile	20	38	1430	2580	1980	1980	1950
	30	57	2040	2540	1840	2220	1940
	40	76	2100	2580	2190	2300	1850
	50	95	2310	2670	2310	2420	1860
	70	153	2250	2200	2320	2160	1850
Elong.	20	38	870	630	840	910	770
	30	57	860	570	700	810	750
	40	76	810	560	750	780	740
	50	95	820	540	740	780	740
	70	153	760	460	720	730	740
Mod. 300	20	38	300	780	380	270	415
	30	57	370	950	570	350	430
	40	76	400	970	540	380	430
	50	95	440	1050	580	410	450
	70	153	460	1070	600	420	450
Mod. 500	20	38	630	1750	840	640	760
	30	57	830	2080	1160	670	810
	40	76	980	2220	1160	980	800
	50	95	1070	2380	1240	1020	810
	70	153	1160	....	1280	1050	805
Duro.	20	38	50	57	53	45	59
(Shore)	30	57	53	60	55	47	59
	40	76	54	61	56	48	60
	50	95	55	61	56	49	60
	70	153	55	61	56	50	60

(a) Mercaptobenzothiazole; (b) Tetramethyl-thiuram-monosulfide.

Friction Compounds

Laboratory tests indicate that a good friction compound can be made by using 40 to 50 parts of Galex on 100 parts of GR-S. Such stocks have a tensile strength of 2000 to 2500 pounds and an elongation of 750 to 800%. They have sufficient tack for building up without the use of solvents. In frictioning, the top and bottom rolls of the calender should be kept hot and the center roll cold. The stocks then band to the center roll and do not pick off. When the stock is frictioned on a 22-ounce duck and cured for 60 minutes at 298° F., the adhesion is between 22 and 26 pounds.

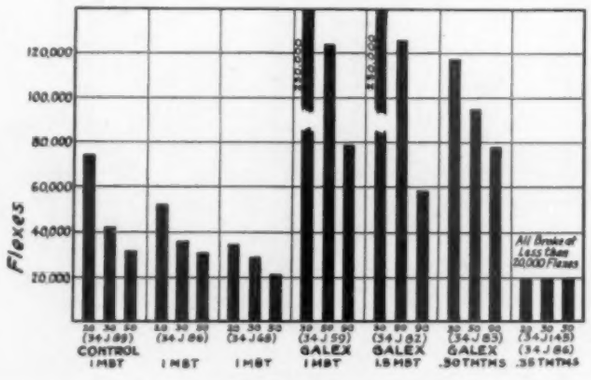

FIG. 3—*Cut Growth Resistance.*
(Cure at 298° F.; 10 parts plasticizer)

The buoyancy provided by the Morner Life Saving Suit is clearly depicted in this illustration.

The Morner Life Saving Suit

DEVELOPED and introduced by Count H. G. Morner, an authority on life saving equipment of Stockholm, Sweden, the Morner Life Saving Suit is finding widespread acceptance among the men of the Merchant Marine. One of the first companies to adopt the suit in the United States was the Standard Oil Company of New Jersey which now supplies it to thousands of the seamen manning its tanker fleet. The suit has been approved by the governments of Norway, Sweden and Denmark, as well as by the U. S. Bureau of Marine Inspection and Navigation. In fact, Scandinavian insurance rates are reduced 10% if these life saving suits are on board ship.

The Morner Life Saving Suit is now being made by the United States Rubber Co. for the Watertight Slide Fastener Corporation, of New York City, the American organization founded by Count Morner. It is ingeniously designed and painstakingly constructed, from close fitting cap to mittens and boots. Of one-piece construction, the foundation is heavy canvas which is first impregnated with rubber and then rubber sheathed, and finally vulcanized. A patented, self-sealing slide fastener makes the suit watertight.

This slide fastener, which is produced by the Ideal Rubber Co., of Brooklyn, N. Y., and supplied to U. S. Rubber for incorporation in the finished suit, is a clever piece of construction in itself. As will be seen from one of the accompanying illustrations, it consists of interlocking rubber zipper profiles which, incidentally, are extruded on the No. 2 Royle extruder, the 3¼-inch machine manufactured and sold by John Royle & Sons, Paterson, N. J. Instead of prongs, broken rings connected by chains slide up and down in the grooves provided in the extruded rubber strips, thus locking the strips together, making them absolutely watertight until the wearer of the suit chooses to release the zipper.

According to Count Morner, the slide fastener, which is an exclusive feature of his life saving suit, assures rapid closing of the suit in a single motion; watertight closing of the collar without any discomfort to the user, thereby avoiding chafing and leakage caused by folding rubberized cloth around the neck (which is said to be the case on suits not equipped with slide fasteners of this type); and ventilation of the suit while in the water which is necessary for the comfort and health of the wearer.

The Morner Life Saving Suit also features a vest built into the suit which contains one-third more kapok than the standard life saving jacket and which, because it is rarely wet, is said to offer still more buoyancy. The vest is so made that the wearer floats with his chest, shoulders and head above water. Weights in the boots keep him in a vertical position even if he should fall asleep or lose consciousness. The suit is

The interlocking all-rubber zipper profiles, which are extruded on Royle machines.

reported to be so buoyant that if tossed overboard empty and open it will support two men easily. If a man is thrown into the water before he has closed the slide fastener, the suit will still hold him up even though full of water.

Loose fitting, the suit also utilizes natural laws of insulation to keep the wearer warm as well as dry. It encloses an air space which, warmed by body heat, serves as a protective blanket against cold and exposure whether the wearer is in the water or riding a life boat or raft. Because his head and shoulders are always high and dry, the wearer can also open the neck of the suit and permit air to circulate inside to insure normal body breathing. Located high on the chest is a pocket for knife, whistle and concentrated food. The kapok vest permits access to this pocket without opening the suit itself, thus affording access to necessities without in any way endangering the life of the wearer.

Despite its complete coverage of the body, the Morner Life Saving Suit can be put on with surprising speed, which is one of its major attractions in time of dire need. An inexperienced seaman can don the suit in one minute, although 16 seconds is said to be sufficient for an expert. The average secured by the men of the Standard Oil tanker fleet is reported to be 22 seconds. The suits are all black, as a rule, but in the case of those supplied to Standard Oil the cap and mittens are bright orange for identification purposes.

The real test of any life saving equipment lies in its actual performance and in this respect there seems to be little doubt that the Morner Life Saving Suit is one of the best devised to date. Numerous letters are on file at the office of the Watertight Slide Fastener Corporation attesting to the life saving qualities of the suit. Several seamen have reported that sharks seem to leave wearers of the suit strictly alone, while attacking and killing others in the water not wearing such suits.

One seaman wrote, "The water didn't come up much higher than my chest although it was fairly rough." Another, "I saved my hands from severe burns through the use of the rubber gloves attached to the suit." Still another, "I used the suit on lookout at all times for the warmth afforded by it was surely appreciated on cold, wet nights."

A full view of the Morner Suit showing the watertight slide fastener.

Count Morner has established an SOS Club to which any sailor who has been picked up at sea wearing a Morner suit, and who writes the inventor describing his experience and offering suggestions to improve the suit, is eligible for membership. Several valuable suggestions have been received in this manner, with the result that constant improvements are being incorporated in the suit.

Witcogum—New Type Chemurgic Rubber

A NEW TYPE of chemurgic rubber, called Witcogum, has been developed from vegetable oils by Wishnick-Tumpeer, Inc., of New York and Chicago. The new rubber-like material, which is comparable to rubber in many of its properties and which is already being used by rubber manufacturers, is said to require neither critical materials nor critical equipment for its manufacture. Calendering, extrusion and vulcanizing are similar to that of rubber and only standard rubber mills and mixers are required. The following information on the properties and applications of the new material has been furnished by the manufacturer:

Witcogum contains an accelerator of the guanidine type and sufficient sulfur to give a cure in 30 minutes at 40 pounds steam pressure (287°F.). Furthermore, all of the necessary vulcanizing ingredients are incorporated in the new material, though it may be loaded and softened as requirements demand. It may be used independently or as an extender blended with natural, reclaimed or synthetic rubber. Blends with reclaim show promise in extending it. A small amount of reclaim added to a Witcogum compound improves molding and facilitates removal from the mold. Softeners may be added to increase tack, improve processing and molding, and to give a more homogeneous product.

The proper compounding of Witcogum with pigments will result in higher tensile strength. Tests have indicated that tensile as high as 450 lbs./sq./in., elongation as high as 150%, Shore hardness of 60 to 65, and tear of 45 to 50 pounds per inch can be obtained. Water, alcohol, and lubricating oils have no apparent effect on Witcogum, nor do antioxidants upon accelerated aging tests. Generally speaking, the reactions of the new material to solvents and chemicals are similar to that of rubber. Witcogum is already being used in the manufacture of hose and tubing, wire insulation, gaskets, shims, brake linings, hospital sheeting, jar rings and extruded channels.

Abstracts of United States Patents on the Compounding and Use of Synthetic Rubber

By FREDERICK MARCHIONNA, M. S. Chem.

Part IX

Walker—U. S. Pat. 2,241,433—May 13, 1941. *Abrasive Articles.* (Assigned to Carborundum Co., Niagara Falls, N. Y.).

In a method of making segmented abrasive discs, etc., a plurality of abrasive segments containing silicon carbide grains, etc., bonded with a ceramic containing resin, rubber, etc., are attached to a metal backing by means of a polychloroprene cement and an intermediate bonding layer from a compounded polychloroprene, the assembly being hot pressed to cure the polychloroprene layers and form a composite article in which the abrasive discs are strongly bonded to the metal base. The joints between the abrasive segments are then filled with a cold setting phenol-aldehyde resin cement. The polychloroprene bonding layer may contain polychloroprene (100), magnesium oxide (4), zinc oxide (5), soft carbon black or channel black or clay (200), cotton seed oil (5), sulfur (1), and an antioxidant (2). Crude or reclaimed rubber may be substituted for part of the polychloroprene.

Yoke—U. S. Pat. 2,241,801—May 13, 1941. *Curing Neoprene.* (Assigned to the B. F. Goodrich Co., Akron, Ohio).

The pre-curing or scorching of compounded polychloroprene stock is inhibited or retarded by incorporating in the stock from 1 to 10% of a retarder, preferably a metallic salt of an oxy acid from boron, silicon and phosphorus, the metal being selected from alkali and alkali earth metals, cadmium, magnesium, zinc, and lead. The preferred salts are sodium silicate, sodium borate, sodium phosphate, calcium borate, and magnesium phosphate. In a number of suggested formulas, the neoprene stock comprises polychloroprene (100), magnesium oxide (10), carbon black (100), rosin oil (10), zinc oxide (5), and phenyl-beta-naphthylamine (2). To each part of this stock there is added 3 parts of sodium silicate or sodium phosphate or lead silicate, or 6.4 parts of zinc borate. If zinc borate is used, zinc oxide is omitted from the stock. Each of these compounds was kept at 158° F. for 8 hours and the loss in plasticity calculated. It was found that with sodium silicate the plasticity loss was 12%; sodium phosphate, 18%; zinc borate, 68%; lead silicate, 68%; while the loss in plasticity when no retarder was used amounted to 99%.

Lewis et al—U. S. Pat. 2,243,386—May 27, 1941. *Printing Rolls.* (Assigned to Vulcan Proofing Co., Brooklyn, N. Y.).

An ink-resistant printing roll comprises a metal core provided with an ink-resistant layer of an alkyd resin in the stage C stabilized with 10 to 60% of a polychloroprene or polybutadiene with a minor proportion of a phenol-aldehyde resin. The patent claims the method of producing the ink-resistant composition and the product obtained. However, the preparation of the printing roll is described, as follows: The metal core, after having been cleaned, is covered with a spirally-wrapped layer 0.075 in. thick from a compounded vulcanizable rubber, followed with a layer of paper and a layer of galvanized iron sheet held in place with a fabric tape. This composite roll is buffed to the desired diameter, coated with a layer of rubber cement which is dried into a tacky condition. A jacket of the ink-resistant composition is then cemented on and cured, this composition comprising an alkyd resin in stage C (100), alkyd-modified phenol-aldehyde resin (15.5), polychloroprene (15.5), resin (0.75), pine tar (0.2), magnesium oxide (1.5), zinc oxide (0.75), brown factice (15.5), antioxidant (0.35), cumar resin (4.75), and cotton seed oil (0.5). The jacket layer is cured at 300° F. for two hours.

Schrauth et al—U. S. Pat. 2,244,263—June 3, 1941. *Plasticized Rubber.* (Assigned to Patchem, A.G., Zurich, Switzerland).

Natural or synthetic butadiene rubber is plasticized by means of a small quantity of a compound from the group consisting of resinic alcohols, esters of resinic alcohols with acids (acetic, lactic, stearic, adipic, phthalic, etc.), alkyl ethers and acetals or resinic alcohols, and cyclo-alkyl ethers of resinic alcohols. These plasticizers can be used in combination with pine oils, tetra or decahydro naphthaline, dimethyl cyclohexanol, etc. In one example, in which polybutadiene is used, a compounded mixture of natural rubber (20) and polybutadiene (20) is plasticized with a resinic alcohol obtained by the catalytic high pressure reduction of rosin or its acetate or its butyl ether (3) and then further compounded with soot (40), silica (10), zinc oxide (5), sulfur (2), and accelerator (0.5). Instead of resinic alcohols there may be used benzyl phenol, methyl cycloexyl cresol, naphthyl cresol, decadyl xylenol, etc.

Dykstra—U. S. Pat. 2,249,686—July 15, 1941. *Polymeric Products.* (Assigned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).

A polymeric material comprises a synthetic linear polyamide and natural rubber or polybutadiene or polychloroprene. The polyamide is obtained either from polymerizable monoamino-mono-carboxylic acids and their amide-forming derivatives or by the polymerization of a diamine with a dibasic carboxylic acid or amide-forming derivatives of such acid. The quantity of the polyamide may be from 1 to 50% of the weight of the mixture and it is most easily effected by a fusion method. Thus, 15 parts of polyhexamethylene adipamide is fused with 100 parts of rubber, or polybutadiene, or polychloroprene peptized with substituted hydrazines, or nitroso naphthols, thiophenols, etc., at about 275° C. to obtain a homogeneous plastic mass which can be molded between aluminum plates. A list of various polyamides is given. Butyl phenol paratoluene sulfonamide, etc., may be used as a plasticizer for the mixture of the polyamide and the natural or synthetic rubber. The mixture is suitable for wrapping articles, or as a casing for sausages, milk and oil containers, etc.

Carl and Nowak—U. S. Pat. 2,253,967—August 26, 1941. *Electrical Insulation.* (Assigned to General Electric Co., Schenectady, N. Y.).

An electrical conductor or cable is insulated by first coating the bare conductor with a layer of non-plasticized cellulose triacetate, which may be in the form of braided fabric or as coating, and then covering this layer with a tape of polybutadiene or polychloroprene. When polybutadiene is vulcanized at 130° C. the mechanical and electrical properties of the cellulose triacetate are retained. A cellulose triacetate tape may be wrapped about the polybutadiene tape before the latter is vulcanized and then removed after the curing is completed.

Kuzmick et al—U. S. Pat. 2,255,891—September 16, 1941. *Abrasive Products.* (Assigned to Raybestos Corp., New York, N. Y.).

A plastic binder for bonding abrasive grains, etc., is obtained by dissolving a cresol-formaldehyde-tung oil complex in an incompletely polymerized chloroprene, the phenolic resin serving to reduce and control the elongation of the polychloroprene and being used in quantity from 10 to 50% of the weight of the polychloroprene. In a specific example, cresol (100), formalin (50), and sulfuric acid (0.25) are refluxed together for about one-half hour to obtain a partially condensed material from which the formed water layer is removed. This condensate is heated to 160° C. and tung oil (100) added. Heating is continued until there is obtained a sticky, solid mass to which there is added five parts of hexamethylene tetramine. This composition is then worked with a partly polymerized chloroprene by milling, until the resin is dissolved in the polychloroprene to form a transparent, plastic mass. The complex mass is then admixed with abrasive grains to obtain a mixture containing polychloroprene (10), phenolic resin (3), zinc oxide (0.5), magnesium oxide (0.5), rosin (0.5), sulfur (0.1), and silicon carbide grains (150), which is worked into a plastic sheet, cut into abrasive wheel blanks, and cured at 310° F. for one to five hours.

Bogeman et al—U. S. Pat. 2,256,189—September 16, 1941. *Preserving Rubber.* (Assigned to General Aniline & Film Corp., New York, N. Y.).

Natural or synthetic rubber is preserved by incorporating therein a small quantity of N'-phenyl-N-cyclohexyl-para-phenylene diamine or N-para-methoxyphenol-N'-cyclohexyl-para-phenylene diamine or N-para-naphthyl-N'-cyclohexyl-para-phenylene diamine, etc. Thus, a compounded synthetic rubber comprising sodium polybutadiene (100), equal quantities of rosin and cautchol as plasticizer (10), stearic acid diethylamide (5), zinc oxide (15), active carbon black (40), sulfur (1), and benzothiozolyl-2-sulfene diethylamide (1), is plasticized with one part of any of the above compounds.

Jage—U. S. Pat. 2,257,607—September 30, 1941. *Polyalkylene Polysulfide Latex.* (German origin).

In a method of preparing latex from polyethylene polysulfide, an alkylene polyhalide is reacted with an alkali polysulfide in an aqueous medium in the presence of the oxide, hydroxide or carbonate of magnesium, calcium or barium, to form an aqueous suspension of the polysulfide. To this suspension there are added, successively and immediately, a dilute solution of a non-oxidizing acid to bring the pH of the suspension to 4 to 6 and then a basic neutralizing agent to raise the pH to about 7.8. In the example given, ethylene dichloride (460) in water (3980) is reacted with sodium tetrasulfide (860) in the presence of magnesium hydroxide (15) to obtain a 12% aqueous suspension of the polysulfide formed. About 1200 grams of this latex suspension is worked with 40 cc. of 2N-aqueous hydrochloric acid to obtain a pH of 6. Immediately thereafter, 10 cc. of 0.2N-ammonia is agitated therein to raise the pH of the latex to 7.5. The latex is allowed to settle and is washed several times with 1000 cc. of water, using a decantation method. The polysulfide latex thus formed is stable and can be filmed or used for coating and impregnating articles.

Sparks et al—U. S. Pat. 2,258,268—October 7, 1941. *Squeeze Rolls.* (Assigned to Standard Oil Development Co., New York, N. Y.).

A wringer roll which is highly resistant to bleaching agents, chlorine-containing or oxidized compounds, oil, etc., and which can be used in dye vats, etc., is made from a copolymer of butadiene and isobutylene, containing 70 to 90 parts of isobutylene and 30 to 10 parts of butadiene, polymerization being accomplished in the presence of aluminum chloride, dissolved in ethyl chloride as catalyst, at a temperature of between —50 and —150° C. A suitable composition for the roll comprises 100 parts of the copolymer from 80 parts of isobutylene and 20 parts of butadiene, whiting (15), zinc oxide (5), stearic acid (5), sulfur (5), and Butyl Zimate (0.5 to 4). This composition is molded about a metallic axle and cured at about 125° C. for one-quarter of an hour to four hours. Vulcanization can be effected without sulfur by using tetramethyl thiuram disulfide as the sulfurizing agent.

Habgood—U. S. Pat. 2,261,760—November 4, 1941. *Golf Balls.* (Assigned to Imperial Chemical Industries, Ltd., London, England).

The cover of a golf ball can be made from a mixture containing a polyethylene having a molecular weight above 1,000 (produced as described in U. S. Patents 2,153,555 and 2,188,465) and polychloroprene or polyisobutylene. A suitable composition comprises a polyethylene having a molecular weight of approximately 15,000 (84), polychloroprene (12) and titanium oxide (4). A ball core is wrapped with rubber thread under tension and placed between two hemispherical shells of the above composition, the assembly being placed in a mold where it is heated at 100° to 115° C. for a few minutes under slight pressure and then heated at 95° to 100° C. under a pressure of one to two tons per square inch, thus molding the ball and curing the cover. The same results may be obtained by dipping the wound ball core in a melt of the above composition to form a seamless cover of the required thickness, which is then cured.

Collins—U. S. Pat. 2,264,173—November 25, 1941. *Polychloroprene Latex.* (Assigned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).

Chloroprene is dispersed in water in the presence of a dispersing agent, which may be acid, alkaline, or neutral, preferably one which is neither strongly acid or strongly alkaline. A small quantity of sulfur is also added and the chloroprene then allowed to polymerize, thereby obtaining a polychloroprene latex containing a small quantity of sulfur chemically combined therewith which can be used like a natural latex. Several tabulated examples are given in which there are used different dispersing agents including alkali metal abietate and hydrogenated abietate or sodium isopropyl naphthaline sulfonate, sodium abietyl sulfate, sodium abietene sulfonate, the sodium salt of sulfated oleyl acetate, C-cetyl betaine, lauryl methyl glucamine, sodium polymethacrylate, cetyl trimethyl ammonium bromide, etc., in quantities from 2 to 8% of the weight of the chloroprene. The quantity of sulfur may vary from 0.25 to 2%, the latter being the maximum quantity which will be dissolved in the chloroprene. In one specific example, from 0.25 to 1% of sulfur is dissolved in chloroprene dispersed in water containing the sodium salt of a sulfated fatty alcohol to form a 20 to 65% dispersion which is allowed to polymerize at 40° C. from 20 minutes to several days.

Learnar—U. S. Pat. 2,264,475—December 2, 1941. *Textile Printing Roll.*

A drum for use in multiple color textile printing is faced with a strongly adherent layer of a polychloroprene composition which does not creep on the drum and which is resistant to oils, inks, etc. The composition comprises polychloroprene (100), a filler, such as whiting, barytes, asbestos, etc. (8.5), carbon black, preferably Gastex (28.5), glue (11.5), zinc oxide (10), calcium oxide (10), cotton seed oil (2), rosin (5), sulfur (1.5), and phenyl-beta-naphthylamine (2). The glue is incorporated to increase the stock's resistance to aro-

matic and chlorinated hydrocarbon solvents. While sulfur is not necessary for the vulcanization of neoprene, it is employed as a vulcanizing agent for lowering the cold flow and permanent set of the material. The composition described is spread on the metal surface of the impression drum to a layer of the desired thickness, and cured at 287° F. for 45 minutes.

Rothrock—U. S. Pat. 2,264,811—December 2, 1941. *Polybutadiene Oily Products.* (Assigned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).

In the production of a polybutadiene having the properties of drying oils, the butadiene is dissolved in benzene, cyclohexane, etc., to form a 20 to 50% solution and polymerized in the presence of from 4 to 14% of an alkali or alkali earth metal or alkali metal hydride at 110° to 170° C. under pressure. Temperature recommended is between 110° and 150° C., because higher temperature will cause the formation of a gelled polymer having little or no drying oil properties. In one example, butadiene (35) in benzene (105) is mixed with sodium (5), placed in a pressure bomb, and heated at 110° C. for three hours to obtain the polybutadiene oily product. The resultant product is filtered through a kieselguhr to remove the catalyst, mixed with 7.5 parts of ethyl alcohol and 4 parts of activated charcoal, heated for one-half hour in a steam bath, and filtered again. On evaporation there is obtained 33 parts of a viscous oily polymer having a deep red color and an iodine number equal to 400 which can be filmed and baked at 200° C. to obtain a hard, glossy and chemically-resistant surface suitable for food and beverage containers. In another example, 150 parts of a mixture containing 32% butadiene and the balance butene, n-butane, 2-methyl propane, etc., is treated as above to obtain a viscous copolymer having drying oil properties. When from 1 to 10% of an alkyl methacrylate, *e.g.* isobutyl methacrylate, is added to these oils, and applied as ground coating to food containers, a better coated container results. Carbon black, titanium oxide, etc., will produce colored enamel when added to the above oils.

Blanchfield and Stafford—U. S. Pat. 2,266,390—December 16, 1941. *Baseballs.* (Assigned to A. G. Spalding & Bros., Inc., Chicopee Falls, Mass.).

A play ball, such as a hand ball, baseball, etc., comprises a core of soft material covered with a fibrous shell, with yarn or thread windings about the covered core, the last winding being preferably from cotton strings. The yarn windings are preferably impregnated with an organic macromolecular material, such as Lucite or Thiokol in ethylene dichloride or Vistanex in naphtha, so as to deaden or retard the flight of the ball. The outer winding may be covered with a low rebound shell from a composition of polyisobutylene (18), polyalkylene polysulfide (45), natural rubber (4), and fillers and curing agents (33); or one of polyisobutylene (29), polyalkylene polysulfide (16), natural rubber (28), and fillers and curing agents (27). An outer leather cover is applied over the core.

Dickson and Stafford—U. S. Pat. 2,267,519—December 23, 1941. *Play Balls.* (Assigned to A. G. Spalding & Bros., Inc., Chicopee Falls, Mass.).

A play ball of minimized variation in rebound with varying temperatures, such as tennis, squash, lacrosse, etc., consists essentially of a rubber composition containing at least 20% of a modifying agent from the class comprising Thermoprene, polyisobutylene and polyalkylene polysulfide. The ball comprises 40 to 60 parts of rubber and 40 to 60 parts of the modifying agent, which is soluble in rubber. In an example using the polysulfide, a solid ball consists of 40 to 60 parts of Thiokol and 40 to 60 parts of natural rubber for 100 parts of the two ingredients.

Pfalzgraff—U. S. Pat. 2,269,229—January 6, 1942. *Electrical Insulation.* (Assigned to General Electric Co., Schenectady, N. Y.).

In the insulation of refrigerating units of the sealed type, having a motor, a gaseous refrigerant of the chlorinated type, and a lubricating oil, the fibre insulation winding is subjected to a vacuum and impregnated with a viscous cement containing 25 to 30% of a plastic polychloroprene. Excess impregnate is removed and the impregnated stator baked at high temperature for a time sufficient to seal the windings between the individual wire turns. A suitable cement for the impregnation comprises a plastic polychloroprene (100), calcined magnesia (10), zinc oxide (5), rosin (2) in xylol, to form a cement of 20 to 30% concentration.

Frolich—U. S. Pat. 2,270,285—January 20, 1942. *Rubberized Fabrics.* (Assigned to Standard Oil Development Co., New York, N. Y.).

In a method of impregnating a fabric with a synthetic rubber-like material, the fabric is saturated with isobutylene, or preferably with a mixture of isobutylene and butadiene, and then treated with a Friedel-Crafts type catalyst at a temperature below —10° C., whereby the butadiene-isobutylene mixture is copolymerized in the interstices of the fabric. A mixture consisting of 70 to 90% isobutylene and 30 to 10% butadiene is condensed into a liquid at the bottom of a closed tank. The fabric is fed into the tank under a roll dipping in the liquid, thus saturating the fibres with the liquid. As the saturated fabric leaves the liquid saturant it is passed between chill boxes filled with liquid ethylene, a temperature of approximately —100° C. existing between the boxes, and while in this chilling chamber a solution of aluminum chloride in ethyl chloride is sprayed on both faces of the fabric, thus effecting copolymerization of the butadiene-isobutylene mixture into the fibres to form an elastic polymer. It is stated that an interpolymerization is probably effected between the cellulose of the fibre and the polymerizable olefinic mixture. When the rubberized fabric is removed from the treating polymerizing device, the catalyst is removed by washing and kneading with an alkali solution. Vulcanization can be effected by either incorporating sulfur, in the form of solution or suspension, in the fibre, or by sprinkling flower of sulfur on the fabric after polymerization of the liquid saturant and heating the fabric at about 140° C. to cure the material. Cotton, rayon fibres, etc., may be treated as described to obtain rubberized fibre sheet which will be resistant to acids, alkalis, oxygen, etc., and which is suitable for use in tire carcasses.

(To Be Continued)

NOTE ON FOREIGN PATENTS

Practically all of the patents originally issued and/or assigned to companies or individuals in enemy or enemy-occupied countries have been vested in the Alien Property Custodian of the United States. Anyone interested in using or exploiting any of the synthetic rubber patents abstracted in this series by Frederick Marchionna is urged to communicate his interest to the Office of the Alien Property Custodian, Washington, D. C. This applies only to those patents issued and/or assigned to companies or individuals in enemy or enemy-occupied countries, which may be determined by the names and addresses shown in connection with each abstract.

Hycar OR-25 —A New Polymeric Hydrocarbon

By D. E. SAUSER

Hycar Chemical Co., Akron, Ohio

HYCAR OR is the generic name for a series of oil resisting synthetic rubbers having a butadiene base. The degree of oil resistance of each type is a function of both the amounts and kinds of co-monomers used during the manufacturing process. Hycar OR-25 vulcanizates are characterized by their superior low temperature flexibility and by their greater swelling in both aliphatic and aromatic hydrocarbons as compared to Hycar OR-15 vulcanizates. This report is primarily a comparison between the new Hycar OR-25 and the well known Hycar OR-15. The formulations for this comparison were selected because they are typical examples of current factory practice.

Mixing

Hycar OR-25 is somewhat more plastic than Hycar OR-15 and therefore requires less breakdown. Age resistors, sulfur and the activation zinc oxide may be added during the breakdown period. The reenforcing pigments are added next, followed by the inert fillers and diluents. This dry method of processing is conducive to good sulfur dispersion, which is extremely important in synthetic compounds. A small amount of softener may be added to highly loaded compounds to facilitate processing, but the major portion of the softener should be added after the pigments. The best physical properties are obtained by allowing the dry mixed batch to age overnight, then adding the softener and accelerator during the remill the following day. This aging and remilling process is recommended particularly for channel black stocks.

Pigmentation

Compounds 1601-HCR-1 through 6 (see table) illustrate the relative effects of channel black, semi-reenforcing and soft black loading. Maximum tensile properties are obtained with the fine particle blacks such as channel types with decreasing tensile properties in the semi-reenforcing and soft blacks. The degree of reenforcing appears to be a function of particle size. Low modulus stocks of good quality may be obtained by the proper choice of pigments, accelerators, or by using reenforcing pigments to obtain tensile strength and softeners to lower the modulus. Compounds 1601-HCR-15 and 16 illustrate the effect of combination of whiting-channel black loadings on modulus. It is interesting to note that the Gastex loaded vulcanizates retain a higher percentage of their tensile strength after immersion in 40% aromatic gasoline than other type loadings.

Acceleration

The acceleration of Hycar OR-25 differs somewhat from that of Hycar OR-15 in that slightly greater amounts of sulfur and accelerator are recommended; however, the acceleration was not changed for the Hycar OR-25 compounds illustrated since it was undesirable to introduce two variables. With this slight difference in mind, the experience gained in compounding Hycar OR-15 is an excellent guide to the compounding of Hycar OR-25. Although conventional rubber accelerators are satisfactory for most formulations, it is interesting to observe that activated Tetrone A vulcanizates are specific for low compression set (1601-HCR-7 and 8) while accelerated compounds using tetramethyl thiuram disulfide as the vulcanizing agent are specific for heat service (1601-HCR-11 and 12). These latter vulcanizates maintained flexibility after an air aging period of 70 hours at 300° F. This is not the case when sulfur is used as the vulcanizing agent.

Low Temperature Service

Maximum cold resistance is achieved through the proper choice of plasticizers. Tributoxy ethyl phosphate, Plasticizer S. C., tributyl aconitate, dibutyl sebacate and mixtures of these materials are useful for low temperature service. Compounds 1601-HCR-7 and 8 illustrate the advantage of Hycar OR-25 over Hycar OR-15 in typical low temperature formulations.

Although coal tar derivatives do not improve or contribute to low temperature service, small amounts are sometimes used to aid processing or to cheapen the compound.

Blends

Hycar OR-25 like Hycar OR-15 can be blended with many existing synthetics to attain properties which are not obtainable through the use of the individual synthetics. For example, mixtures of Hycar OR-25 with Koroseal, Vinylite, Thiokol, neoprene, etc., are known to produce vulcanizates that are most unique in their physical properties. Such blends open the possibility of meeting many requirements heretofore thought impossible.

COMPARISON BETWEEN COMPOUNDS OF HYCAR OR-25 AND HYCAR OR-15

Compound	Channel Black 1601-HCR-1	Channel Black 1601-HCR-2	Semi-Reinforcing 1601-HCR-3	Semi-Reinforcing 1601-HCR-4	Soft Black 1601-HCR-5	Soft Black 1601-HCR-6	Low Temperature Service 1601-HCR-7	Low Temperature Service 1601-HCR-8	Low Compression Set 1601-HCR-9	Low Compression Set 1601-HCR-10	Whiting & Channel Black 1601-HCR-15	Whiting & Channel Black 1601-HCR-16	Heat Resistant Service 1601-HCR-11	Heat Resistant Service 1601-HCR-12	OS-10 Blends 1601-HCR-13	OS-10 Blends 1601-HCR-14
Hycar OR-15	100.	.....	100.	.....	100.	.....	100.	.....	100.	.....	100.	.....	100.	.....	75.	.....
Hycar OR-25	.....	100.	.....	100.	.....	100.	.....	100.	.....	100.	.....	100.	.....	100.	.....	75
Hycar OS-10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25.	25.
Zinc oxide	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
Stearic acid	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.	1.
1107-HCR-88 (a)	6.	6.	6.	6.	6.	6.	6.	6.	2.	2.	2.	2.	.....	.....	2.	2.
Benzothiazyl disulfide	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3.	3.	1.5	1.5
Tetramethyl thiuram disulfide	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.	3.	.....	.....
Coumarone-indene resin	10.	10.	10.	10.	10.	10.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dibutyl phthalate	15.	15.	15.	15.	15.	15.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tetrone A	.....	.....	.....	.....	.....	.....	.....	.....	0.75	0.75	0.75	0.75	.....	.....	0.75	0.75
Plasticizer SC	.....	.....	.....	.....	.....	.....	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Tributoxy ethyl phosphate	.....	.....	.....	.....	.....	.....	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Channel Black	50.	50.	.....	.....	.....	.....	.....	.....	.....	.....	40.	40.	.....	.....	.....	.....
Semi-reinforcing black (b)	.....	.....	70.	70.	.....	.....	70.	70.	70.	70.	.....	.....	70.	70.	70.	70.
Soft black	.....	.....	.....	.....	100.	100.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fine ground whiting	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40.	40.	.....	.....	.....	.....
	188.00	188.00	208.00	208.00	238.00	238.00	213.00	213.00	209.75	209.75	219.75	219.75	211.5	211.5	210.25	210.25
PHYSICAL PROPERTIES OF THE VULCANIZATE																
Original																
Min. Cure @ 310° F.	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Modulus @ 300%	900	750	1750	1400	710	500	2000	1500	1820	1700	720	600	1250	690	1475	1400
Ultimate Tensile	3600	2375	2780	2400	1925	1590	2925	2350	2680	2310	2750	1720	2900	1800	2120	1850
Ultimate Elongation	675	600	530	495	710	795	540	445	475	415	565	500	665	620	450	400
Tensile Sheet Hardness	67	63	63	58	60	54	56	52	54	54	54	54	50	49	54	54
Flexible to °F. (Loop Method)	—14	—32	—14	—32	—14	—32	—58	—76	—50	—68	—58	—76	—56	—68	—58	—68
Brittle @ °F. (Loop Method)	—58	—76	—58	—76	—50	—68	—86	—104	—94	—104	—94	—94	—86	—94	—86	—94
SAE-ASTEM parallel bend test																
5 hours @ —40° F.	Broke	Broke	Broke	OK	Broke	Broke	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
5 hours @ —65° F.	Broke	Broke	Broke	Broke	Broke	Broke	Broke	OK	OK	OK	OK	OK	Broke	OK	Broke	OK
Specific Gravity	1.19	1.17	1.23	1.22	1.28	1.26	1.22	1.20	1.21	1.20	1.28	1.27	1.21	1.20	1.21	1.20
½-Inch Disc Cured @ 310° F. for 60 Minutes																
Shore Hardness	66	62	62	59	60	55	56	53	55	54	54	52	52	47	55	53
% Lupke Rebound	40	60	55	68	54	71	69	75	70	75	60	69	66	74	67	74
% Comp. Set ASTM Method B	14	16	10	9	9	9	11	8	6	4	13	13	12*	10*15†	7	7
% Comp. Set 70 hrs. @ 212° F.	70	70	65	63	62	60	60	55	40	36	45	45	44*	40*55†	33	32
Aged in Air Oven 70 Hours at 212° F.																
Ultimate Tensile	3100	2625	3350	3100	1350	1420	3100	2650	2700	2350	2950	1780	2600	2250	2010	2100
Ultimate Elongation	265	255	250	260	350	300	315	275	300	285	425	345	365	355	285	285
Shore Hardness	86	86	80	76	76	72	62	61	62	63	62	63	64	61	61	64
180 Bend	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Immersed in ASTM-SAE Oil (Aniline point 159° F.) 70 Hours at 212° F.																
Ultimate Tensile	3100	2225	3000	2200	1440	1350	3100	2350	2475	1880	1900	1760	2540	1950	1680	1400
Ultimate Elongation	410	385	390	330	505	580	340	340	315	280	375	375	385	450	300	275
Shore Hardness	72	63	69	60	65	54	67	59	65	58	63	55	65	51	55	50
% Volume Change	—2	+4	—3	+5	—3	+3	—7	—1	—7	+0.8	—6	+2	—8	+0.8	+10	+20
Immersed in AN-VV-O-366 Oil (Aniline point 189°F.) 70 Hours at 212° F.																
Ultimate Tensile	3475	1680	2980	2220	1210	1125	2650	2520	3000	2200	1990	1650	2190	2100	1850	1590
Ultimate Elongation	385	295	340	320	315	340	220	305	335	305	375	365	345	410	300	270
Shore Hardness	75	65	71	63	68	59	69	62	70	60	60	58	67	60	60	54
% Volume Change	—6	—2	—7	—2	—5	—2	—9	—5	—11	—3	—10	—10	—11	—6	+4	+12
Immersed in Paraffin Lub Oil (Analine point 230° F.) 70 Hours at 212° F.																
Ultimate Tensile	4500	2900	3200	2590	1325	1360	3000	2920	3190	2900	2520	1700	2590	2550	2480	2125
Ultimate Elongation	435	405	405	335	395	395	260	365	340	340	475	385	375	455	320	315
Shore Hardness	80	71	76	70	73	65	69	62	70	60	75	62	70	66	69	65
% Volume Change	—10	—9	—10	—9	—9	—8	—9	—5	—11	—3	—14	—13	—14	—12	—12	—7
Immersed in 100 Octane Gasoline 70 Hours at Room Temperature																
Ultimate Tensile	3500	2800	2625	2190	1800	1050	2550	2120	2300	1920	2600	1590	2140	1700	1580	1510
Ultimate Elongation	650	600	510	435	675	640	440	385	465	360	555	455	555	600	375	310
Shore Hardness	67	59	63	55	60	52	56	53	57	54	54	51	54	47	54	51
% Volume Change	+0.3	+2	+1	+2	—0.1	+2	—0.8	+1	—0.8	+1	+0.3	—0.7	—1	+1	+8	+6
Immersed in 100 Octane Gasoline with 40% Aromatics 70 Hours at Room Temperature																
Ultimate Tensile	1275	640	1600	1220	750	400	1425	1250	1290	950	475	450	1500	950	900	600
Ultimate Elongation	385	285	325	275	530	340	275	285	275	215	285	265	470	400	225	170
Shore Hardness	50	45	48	43	47	38	49	44	50	50	43	44	44	35	43	45
% Volume Change	+21	+29	+21	+26	+17	+26	+17	+21	+15	+22	+19	+19	+18	+24	+34	+48

(a) 1107-HCR-88 Sulfur Masterbatch: Hycar OR-15(100), channel black (3), [illegible] In these recipes. (*) Deflection 30%. (†) Deflection 40%.

Compound 1601-HCR-13 illustrates the effect of blending Hycar OR-25 with oil soluble (OS) Hycar. Here the function of the Hycar OS-10 is to improve processing and avoid decrease in volume during fluid aging.

Summary

Processing:—Hycar OR-25 has approximately the same easy processing as Hycar OR-15.

Compounding:—Same general compounding technique as used in Hycar OR-15 except that slightly greater amounts of sulfur and accelerator are recommended.

Tack:—The tack of comparable Hycar OR-15 and OR-25 compounds is similar.

Tensile Strength:—On data obtained to date tensile strengths of Hycar OR-25 vulcanizates are lower than Hycar OR-15 in about the following proportions:

Channel black	800 to 1000 p.s.i.
Semi-reenforcing black	400 to 500 p.s.i.
Soft black	300 to 400 p.s.i.

Elongations:—Present indications are that usually the elongations of Hycar OR-25 vulcanizates are somewhat less than comparable Hycar OR-15 vulcanizates.

Hardness:—Hycar OR-25 vulcanizates generally have a lower durometer hardness than vulcanizates of Hycar OR-15 which permits greater loadings to obtain the same hardness. Vulcanizates of Hycar OR-25 containing the same pigment volume loadings as Hycar OR-15 are lower in durometer hardness. This permits the compounding of equal hardness stocks with a lower synthetic hydrocarbon content and a lower materials cost.

Low Temperature Flexibility:—Hycar OR-25 vulcanizates are considerably better (15°F. or more) for low temperature flexibility than similar Hycar OR-15 compounds.

Rebound:—The rebound (Lupke) of Hycar OR-25 compounds is approximately 15% to 20% higher than comparable stocks of Hycar OR-15 vulcanizates.

Compression Set:—The compression set of Hycar OR-25 vulcanizates is somewhat lower (better) than that of equivalent vulcanizates of Hycar OR-15.

Air Oven Aging:—Air oven aging at 212°F. indicates that Hycar OR-15 and Hycar OR-25 vulcanizates have the same good heat resistance.

Swell in Solvents:—As the data indicates Hycar OR-25 has somewhat greater swell than Hycar OR-15 when immersed in oils. Swell in aromatic fuel is, however, quite comparable.

New Method of Waterproofing

AN INVISIBLE "raincoat" which can be formed on cloth, paper and many other materials by exposing them to chemical vapors from a new compound, thereby making them water-repellent, has been developed by the General Electric Co., Schenectady, N. Y. The development was the work of Dr. Winton I. Patnode of the company's research staff, who is now studying many possible uses of this new method of waterproofing.

Called Dri-Film, one of the most important uses of the new compound so far is in the treatment of ceramic insulators for radio equipment being made for the armed forces. It is about nine times more effective than the wax generally used as a water repellent and its results are permanent, according to the company's announcement.

Dri-Film is a clear liquid composed of various chemicals which vaporize at a temperature below 100° C. Articles to be treated are exposed, in a closed cabinet, to the vapors for a few minutes. Then they are taken out and, if necessary, are exposed to ammonia vapor. This is to neutralize corrosive acids which may collect during treatment.

Dr. Patnode is not able to explain exactly what happens in the process, but the result is that an extremely thin film is formed on the surface. This "raincoat" is so thin that its structure cannot be determined by chemical analysis. It cannot be seen under a high-powered microscope. But, whatever its nature, it prevents water from spreading to form a continuous film. If moisture does collect, it is in the form of small isolated drops.

Probably the biggest use of ceramic forms today is in radio communications equipment where high electrical resistance between conductors is absolutely essential to successful performance, according to E. E. Williams, G.E. electronics engineer. "These ceramic insulators, when dry, provide extremely high electrical resistance. However, in service one of the adverse conditions frequently met has been condensation of moisture on the surfaces of the ceramic forms. Such condensation, if not controlled, forms a film of water and reduces the resistance between conductors to the point where excessive leakage of current results, and the performance of the equipment is impaired. Consequently, manufacturers have for years treated ceramic parts, built into this type of apparatus, with materials which to a greater or less degree reduce the effects of condensation. In the past, the best methods of treating these parts have been varnishing and waxing. Searching for a better and more effective method, Dr. Patnode developed the new and radically different treating material."

G.E. Research Laboratory tests show the wide difference in the water-repellent characterics of ceramic surfaces when glazed or treated with wax, and with the new compound. These tests were made under conditions of temperature and humidity similar to those met by military forces in service from the arctic to the tropics. Tests of surface resistivity were made on a number of closely controlled specimens which had been subjected to the condition of 100 per cent relative humidity at 25° C. with the ceramic parts precooled below the dew point. A value of 100 was arbitrarily assigned to the surface resistivity of unglazed ceramics that had been treated with wax. On the same basis of evaluation, parts treated with Dri-Film were found to have a surface resistivity of 870.

Have you ordered space yet in the 1943 RUBBER RED BOOK?

Rubber Reserve Company's Tentative Specifications for GR-S

The following tentative specifications for GR-S (Buna S) manufactured in Government-owned plants were established on February 6, 1943, by the Rubber Reserve Company. The issuance of these specifications, herewith reproduced in full, does not imply any change in the test method or analytical methods previously issued by the Office of the Rubber Director, covered in Pages 111-2, 111-3, and 111-4, dated September 1, 1942, of the loose-leaf technical bulletins supplied by that Office to the rubber industry at large.
—Editor.

I. Sampling

A. For control purposes, rubber is to be samples from the dryer using a minimum of 4 pounds total sample weight. This weight to be obtained through blending of a minimum of 4 samples taken every two hours, each of which is not less than 1 pound. Blending of these samples is to be made on a cool mill according to Crude Rubber Committee procedures and on ASTM specified equipment. Sampling by consumers is to be done according to methods recommended by Crude Rubber Committee of the American Chemical Society.

B. Sample Distribution.

1. Chemical Analysis ....½ pound
2. Physical testing ..... 1 pound
3. Stocked sample ..... 1 pound (Sample to be kept one month maximum)
4. All unused sample to be returned to process.

II. Chemical Analysis

	Test	*Specification (Maximum %)*
A.	Acetone extract	10 %
B.	Heat Loss	0.75%
C.	Fatty Acid (as stearic acid)	3.0 to 6.0%
D.	Soap (soluble—sodium stearate)	1.00%
E.	Ash	1.5 %

Analytical Methods

A. *Acetone Extract:* The extraction apparatus used shall be of the type described in ASTM D-297-41T. The flask shall be heated so that the period of filling an empty siphon cup with acetone and completely emptying it will be between 2.5 and 3.5 minutes.

Place 2 g. of rubber in a thimble made by folding a filter paper so that it will fit in the extraction cup, which is suspended in a weighed extraction flask. Extract the sample continuously for 24 hours, unless the solution in the thimble is still colored at the end of that time, when the extraction shall proceed for a further period of 4 hours or longer. Carefully note all characteristics of the acetone extract, both when hot and cold. Distill off the acetone on a steam bath, recovering the acetone if desirable, at as low a temperature as possible. Loss of extract by bumping can be avoided by means of a gentle current of air. Dry the extraction flask and contents in an air bath for 1 hour at 70°C., cool, and weigh. Call the residue acetone extract (uncorrected).

Percentage of acetone extract, uncorrected

$$= \frac{\text{Wt. of extract}}{\text{Wt. of sample}} \times 100$$

B. *Heat Loss:* a. Approximately 2 grams of material are accurately weighed into a tared porcelain crucible of 30 cc. capacity, having a top diameter of 45 mm. and a height of 30 mm. which has been ignited in a 1000°C. muffle furnace to constant weight. Place in a 105°C. oven for exactly two hours. Remove, cool in a desiccator, and weigh.

b. Following the same procedure as in "a" heating losses may be determined also by heating for exactly two hours in a 70° oven.

Calculation:

$$\% \text{ Heating Loss} = \frac{(A - B)}{C} 100$$

A = Wt. of crucible and sample before heating.
B = Wt. of crucible and sample after heating.
C = Wt. of sample.

Save this sample for ash or ignition.

No part of the oven used should vary more than 1°C. from the designated temperature.

C. *Determination of Fatty Acid:* Weigh 2 g. of a thinly sheeted sample or of finely divided crumbs into a 500 ml. wide mouth flask. Add 25 ml. of 2-B-ethanol and 50 ml. of benzene (preferable thiophene free) to the flask or if the flask is not at least 1 inch full add more solvents in the same proportions. Reflux for 30-45 minutes or allow to stand at room temperature for 16 hours.

Add 8-10 drops of the thymol blue-phenolphthalein indicator and titrate with 0.05—0.1 N NaOH solution to a purple or blue end point that is permanent for at least 30 minutes.

Calculation:

$$\% \text{ FA} = \frac{\text{ml. NaOH} \times \text{equivalent grams FA per ml.} \times 100}{\text{Weight of sample}}$$

D. *Determination of Soap:* Proceed as for FA up to the addition of the indicator. Add 4-5 drops of 0.1% brom phenol blue solution in 20% alcohol. Titrate with 0.05 N HCl (not H_2SO_4), shaking thoroughly until the indicator changes through green to yellow. The end point taken should be permanent for at least one minute. If more than 3 ml. of acid are used the solution will form a milky emulsion. The end point is readily seen in this solution, but violent agitation is necessary and the reaction proceeds slowly.

Calculation:

$$\% \text{ Soap} = \frac{\text{ml. HCl} \times \text{equivalent grams of soap per ml. HCl} \times 100}{\text{Weight of sample}}$$

E. *Ash Determination:* Ash the sample in a crucible previously ignited to constant weight in a muffle furnace by heating at the following rate:

Time, minutes.....	0	5	10	15	70	75	80	85	145
Temperature, deg. C.	R.T.	100	200	300	300	400	500	550	550

Remove the crucible from the furnace, cool, and weigh.

$$\% \text{ Ash} = \frac{\text{Weight of ash}}{\text{Weight of sample}} \times 100$$

If no furnace is available, distill off the rubber or organic material over a very small flame, not allowing it to catch fire, and ignite gently until burnt clean, cool, weigh, and calculate ash.

III. Physical Tests

A. *Plasticity:* Plasticity to be determined on Mooney Viscosimeter with one minute warm-up, reading at 1½ minutes after starting the motor. Viscosity limits 45 to 60 at 212°F.

B. *Recipe:*

Polymer as received	100.0
Channel Black*	50.0
Zinc Oxide	5.0
Mercaptobenzothiazole	1.5
Sulfur	2.0
Refined coal tar rubber softener	5.0

Batch size equal to three times recipe in grams

* Specify as to so-called coarse Channel Black such as Cabot No. 9, WYEX, W-6, Kosmos-77, Continental-AA, or similar blacks proved to be equivalent.

C. *Milling Practice:*

Equipment—ASTM D15-41.

Mill opening—ASTM D15-41.

Temperature of mill—70°F. to 100°F. at start; maximum 130°F.

Order of Milling:

1. Two tight refinings on the crude rubber.
2. Adjust mill to proper opening to give continuous sheet on the mill.
3. Break down rubber 10 minutes, making ten ¾ cuts each way.
4. Add channel black slowly, cut two times each way—total time 10 minutes.
5. Add softener in one minute.
6. Add zinc oxide, accelerator and sulfur in one minute.
7. Cut three ¾ cuts each way.
8. Roll and pass the stock endwise through mill six times.
9. Sheet out and allow to rest eight hours. (Total time of mixing 28 minutes maximum)
10. Refine two passes through tight mill, sheet to desired thickness to conform to ASTM 15-41 tensile sheets and cure within three hours.

D. *Curing and Testing:* 50 minutes @ 45 pounds steam—ASTM mold.

Tensile	2500 pound minimum
Elongation	450% minimum
Modulus @ 300%	800 minimum
	1400 maximum

Testing according to ASTM D412-41, sections 6, 7, 8, and D15-41.

Styraloy 22—A New Synthetic Elastomer

STYRALOY 22, a new plastic which is said to achieve in a single composition the low temperature flexibility of rubber, electrical properties approaching those of polystyrene, excellent heat and corona resistance at elevated temperatures, a low specific gravity of 0.96, and the versatility in fabrication procedure characteristic of thermoplastic materials, has been introduced by the Dow Chemical Co., Midland, Mich. The following information on the new material has been taken from a booklet issued by the manufacturers:

Styraloy 22 is a synthetic elastomer of the hydrocarbon type, especially designed to replace rubber in many applications which are vital to the war effort. Its excellent electrical and mechanical properties, low temperature flexibility, resistance to oxygen and ozone, and low cold flow at elevated temperatures makes it eminently suitable for electrical applications where both low and high temperatures are encountered. While ignition cable and low frequency coaxial or other electric cable insulation is the most pertinent use for the new material, its general characteristics suggest a wide variety of applications for extruded, injection molded, and compression molded products.

Predominantly hydrocarbon in nature, Styraloy contains a small amount of added antioxidant. It has a tendency to self-vulcanize, with consequent decrease in thermoplasticity and gain in solvent resistance when held at elevated temperatures for long periods. This fact naturally affects the manner in which it should be handled during fabrication. It is a free-flowing gray powder which is supplied in several types depending on the hardness desired.

Styraloy 22 does not require hot working or compounding prior to extrusion unless plasticizers or other modifying components are to be added. Passing the material through a hot mill at, for example, 40 pounds steam pressure, will produce a more uniform and better appearing extrusion, although there may be a slight loss in tensile strength and elongation. In general, the powder is introduced directly to the tuber, using a vibrated feeder driven by an electro-magnet. The powder may be given a short pre-drying treatment, preferably at temperatures not exceeding 150°F., to insure smooth coatings and optimum electrical properties. This is especially important if the polymer has been stored in damp surroundings.

Since Styraloy undergoes a slight loss in thermoplasticity on heating, it should be extruded at the lowest temperature which will give a smooth, glossy gray-blue sheath. The following temperature schedule has been found satisfactory for use on conventional extrusion equipment: The feed zone should never be heated, and if it tends to run warm, water cooling may be necessary. The barrel and cross-head of the extruder should be maintained at 340 to 350° F. The die temperature should be held at 350 to 370° F., preferably with an auxiliary electric heater which allows close and rapid temperature control. Best results have been obtained within these narrow temperature ranges. Higher or lower temperatures tend to give rough surfaces.

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New A.S.T.M. Emergency Alternate Provisions

IN ORDER THAT the Standard Specifications for Friction Tape for General Use for Electrical Purposes (D 69-38) and Rubber Insulating Tape (D 119-38) can be used and be in line with orders issued by the War Production Board which prohibit the use of crude rubber or latex in friction tape or limit the new rubber in rubber insulating tape to a maximum of 7 pounds of new rubber and 21 pounds of reclaimed rubber per 27,000 square inches of 0.027 gage tape, Committee D-11 on Rubber Products of the American Society for Testing Materials has developed emergency alternate provisions, reprinted below. The modifications also bring the specifications in line with recently adopted changes in Federal Specifications E-HH-T-101a.

The emergency provision applying to the Standard Specifications for Insulated Wire and Cable: Heat-Resisting Rubber Compound (D 469-41), also reprinted below, are intended primarily to conserve rubber and provide an agreed-on specification for insulation which may be operated at copper temperatures above 60° C. The requirements are acceptable to a number of organizations whose inspection or activities involve a use of the material, and since there has been no other standard available, the new provisions will serve an important need and can be referred to in restrictive orders of the War Production Board and can be made available to commercial organizations and Underwriters Laboratories.

EA-D 69
Issued, November 25, 1942

The following Emergency Alternate Provisions, when specified, may be used as an alternate in A.S.T.M. Standard Specifications for Friction Tape for General Use for Electrical Purposes (D 69-38), and affect only the requirements referred to:

Section 3.—Add the following requirements at the end of this section on frictioning compound:

The finished tape shall contain not more than 30 lb. of rubber hydrocarbon per 100 sq. yd. No new rubber shall be used in the manufacture of this tape.

Section 6.—Change this section to read as follows:

6. The tape shall show tackiness, that is, ability to stick to itself after light contact has been made, when tested front to front in accordance with the procedure described in Section 21.

Section 7.—Omit this section which prescribes the requirement for discoloration of copper.

Section 13.—Change the permissible variations in thickness from "plus or minus 0.002 in." to read "plus or minus 0.003 in."

Section 17.—Change the heading of this section to read "Storage" and omit the last sentence covering guarantees.

Section 19 (a).—Change the requirements for dividing into lots for sampling the number of rolls offered for inspection to read as follows:

Rolls Offered for Inspection	Number of Lots
500 and under	1
501 to 1500	2
1501 to 3000	3
Over 3000	3 plus 1 for each additional 1500 rolls

Section 20.—In the first sentence of Paragraph *(a)* change the length of specimen required for the adhesion test from "23 in." to read "30 in."

In the third sentence of Paragraph *(a)* change the length of tape required to be wound around the mandrel from "19 in." to read "25 in."

In the sixth sentence of Paragraph *(a)* change the maximum length that may unwind in the first 1-min. interval from "15 in." to read "25 in."

Omit Paragraph *(b)* which describes the oven test for tape.

Section 21.—In place of the fifth and sixth sentences of Paragraph *(a)* which reads as follows:

Tackiness in at least two of the combinations *(1)*, *(2)*, and *(3)* specified in Section 6 shall be such that the point of separation remains approximately in the same horizontal plane as the hands that pull the tape apart. In the back to back combination the specimens shall show some indication of tackiness by the point of separation traveling along the tapes as the hands pull the tape apart.

substitute the following:

The tackiness specified in Section 6 shall be such that the point of separation remains approximately in the same horizontal plane as the hands that pull the tape apart.

Change Paragraph *(b)* to read as follows:

(b) The tackiness shall be determined three times and if more than one test fails to conform to the requirements specified in Section 6, the tape shall be considered as not conforming to the tackiness requirement.

Section 22.—Omit this section which describes the test for discoloration of copper.

EA-D 119
Issued, November 25, 1942

The following Emergency Alternate Provisions, when specified, may be used as an alternate in A.S.T.M. Standard Specifications for Rubber Insulating Tape (D 119-38), and affect only the requirements referred to:

Section 2.—Omit from this section the last sentence which reads as follows:

Preferably, the tape shall be dark gray in color.

Section 4.—Change the requirements for the composition of the rubber compound to read as follows:

4. The rubber compound shall contain not more than 7 lb. of new rubber and not more than 21 lb. of reclaimed rubber per 27,000 sq. in. of tape 0.027 in. in thickness.

Section 5.—Change the requirements for tensile strength and elongation to read as follows:

5. *(a)* The tensile strength of the tape shall be not less than 200 psi.

(b) The elongation of a 2-in. gage length determined simultaneously with the tensile strength shall be not less than 250 per cent.

Section 6.—Change the requirement for dielectric strength to read as follows:

6. The dielectric strength of the tape shall be not less than 300 v. per mil of thickness.

Section 8.—For all three widths of tape change the requirements for thickness from "0.030 in." to read "0.027 in."

Section 13.—Change the heading of this section to read "Storage" and omit the last sentence covering guarantees.

Section 15 (a).—Change the requirements for dividing into lots for sampling the number of rolls offered for inspection to read as follows:

Rolls Offered for Inspection	Number of Lots
500 and under	1
501 to 1500	2
1501 to 3000	3
Over 3000	3 plus 1 for each additional 1500 rolls

Section 16.—Omit this section covering the procedure for chemical analysis of the rubber compound.

EA-D 469a

(Standard Specifications for Insulated Wire and Cable: Heat-Resisting Rubber Compound (D 469-41)

Issued, January 15, 1943
(Superseding Issue of April 6, 1942)

This Emergency Alternate Provision modifies a previous Emergency Provision by the following additional changes:

Section 2.—Omit the last clause which reads as follows:

"including the use of a temperature of 80° C. in the oxygen pressure chamber aging test."

Table I.—Replace the present Table I with a new Table I reading as follows:

TABLE I.—PHYSICAL TEST REQUIREMENTS FOR INSULATION

Tensile strength, min., psi	850
Elongation at rupture, min., per cent	300
Set in 2-in. gage length, max., in.	0.5
Loss in tensile strength and elongation after 20 hr. in air pressure heat test, max., per cent	50

Table III.—Decrease the tabulated values for insulation resistance by one-third.

In the Note to Table III change the value of the constant *K* from "15,840" to read "10,560."

Some Data on Synthetic Rubber from Grain*

THE INTEREST of Joseph E. Seagram & Sons, Inc., in synthetic rubber production has been confined to grain only. Three routes have been proposed for synthetic rubber production from grain:

(1) Through butyl alcohol;
(2) Through ethyl alcohol;
(3) Through 2-3 butylene glycol.

Our efforts have been concentrated on the glycol process because a careful comparison of the three processes has revealed that one bushel of corn (61% starch, wet basis and 12% moisture) will yield butadiene in the following amounts:

2.09 lbs. by the butyl alcohol process;
5.60 lbs. by the ethyl alcohol process; and
6.25 to 6.50 lbs. by the butylene glycol process.

Assuming that the 6.50 lbs. yield by the butylene glycol process is 100% efficient, then the ethyl alcohol process is 73%, and the butyl alcohol process 26% as efficient.

Furthermore, the purity of the butadiene produced is scaled in about the same order. This glycol process is the only process, grain or petroleum, that will deliver 98.5% pure crude butadiene from the converter. The post-war survival power of this process is increased by the fact that butylene glycol, produced from farm crops, will be a new chemical with many potential uses.

Our research on this process has involved a study of three phases:

(a) Fermentation;
(b) Recovery; and
(c) Conversion to butadiene.

This work is coordinated with that conducted by the scientists at the Northern Regional Research Laboratory, of the United States Department of Agriculture, at Peoria, Illinois.

In fermentation, a suitable bacterial culture is employed. This organism does not ferment starch. Since malt conversion is unsatisfactory because malt is not sterilized at conversion temperature, and permits introduction of serious contaminants, the grain must be hydrolized by acid. The conditions and processes for continuous acid hydrolysis have been developed, making it possible to convert 95 to 100% of the starch into auger. From an aerated mash to which suitable nutrients were added, we have produced 13.0 to 14.0 lbs. of glycol per bushel of corn. Further research may well raise this figure to 14.0 lbs. or even more.

In recovery, considerable work has been accomplished with a suitable solvent extraction of glycol from the mash. With this process, and employing crude pilot plant equipment, 90 to 95% glycol recovery has resulted. At present, we are working on a spray drying process which will be simpler.

As for conversion, the esterification and conversion studies have shown that by pyrolysis of acidified glycol, 80% of the theoretical yield of butadiene is obtained. The patent claims a yield of 90%, but as yet we have not achieved this goal. Butadiene thus obtained analyzes 98.5% purity.

In summing up: a 14.0 lbs. yield with 95% recovery and 80% conversion is equivalent to 6.25 lbs. of butadiene per bushel of grain. Of course this figure is capable of improvement.

After careful engineering studies, we have found that a plant which can produce 20,000 tons of butadiene by the 2-3 butylene glycol process would cost $4,263,500.00, or $213 per ton capacity. The cost of production is estimated at 18.2c per lb. from corn, at 80c per 56 pound bushel.

In our opinion this is the best process for obtaining butadiene from grain if additional plants are to be constructed.

* Abstracted from a talk on "Chemurgic Rubber," delivered by Dr. Paul Kolachov, technical counselor, Joseph E. Seagram & Sons, Inc., Louisville, Kentucky, at the Ninth Annual Chemurgic Conference, Chicago, Ill., March 25, 1943.

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Editorials

Synthetic Rubber After the War

IN VIEW of the fact that there are still several obstacles to hurdle before the synthetic rubber program begins functioning smoothly and produces sufficient volume for immediate needs, there seems to be little reason for any discussion on the future of the synthetic product in the post war period. Yet, the gauntlet has been flung in this direction and the battle lines are already forming. Official Washington is breaking into two distinct camps on the subject and the fur is bound to fly before many months go by.

In many quarters Vice-President Henry Wallace is considered the "voice" of the present administration. So when the Vice-President suggests that synthetic rubber production be virtually abandoned after the war he may be considered as offering the views of the White House and his comments cannot be dismissed as "political." At least twice in recent months, Mr. Wallace has expressed this view, once in an article in the *New York Times* and more recently in one of his frequent talks. He takes the attitude that if the continuation of the synthetic rubber industry after the war depends upon a high tariff for the industry to compete with natural rubber, the industry should be eliminated, or at least confined to close quarters. Or, in other words, he is re-expressing his opinion that an industry has no reason to exist which cannot compete with foreign production in the American market except behind a high tariff wall.

Mr. Wallace's declarations on the post war status of the synthetic rubber industry are based on "global" thinking. Much can be said in favor of giving world-wide consideration to any domestic problem since isolationistic tactics in the past have not been particularly successful. If allowed free rein again in the future, we are inclined to agree with Mr. Wallace that World War No. 3 would simply be a matter of time—and rearmament. Particularly is this true of rubber, since the United States has launched a long range program in Latin America to restore that area to its former prominence in the world rubber picture as the ranking producer of war's number one material.

We doubt, however, whether any decision or attempt to halt the progress of the synthetic rubber industry in the post war period will meet with any popularity or much success, for a number of reasons. For instance, the lessons learned in actual production of mass scale synthetic, combined with heightened research, is bound to bring the cost of the synthetic product down to a point where it can successfully compete with natural rubber. Even should the synthetic product still require some crude, more than sufficient quantities of the latter could be secured from the new-old industry of Latin America. It is doubtful whether any high tariff wall will be necessary to protect the economic interests of the post war industry.

It is also equally doubtful whether the public, which has formed a nationalistic opinion on all essential materials, especially on rubber, will permit any administration to dispose of government-owned synthetic rubber plants in order to revive trade with the Far East or even under the guise of the "good neighbor" policy. In this connection there would be no attempt to abrogate our policies with the various Latin American countries because there would be little doubt that we could absorb all the crude rubber such countries could produce at any time. Nobody believes that synthetic rubber will ever competely usurp the natural product unless the truly "synthetic rubber" should some day be discovered.

There is still another reason why any official attempt to hold down the production of synthetic rubber in this country or to abandon the government-owned plants would meet with opposition, this one political in nature. The Farm Bloc in Congress, one of the most powerful pressure groups in the country, has done an exceptionally good job of convincing the American farmer that his major hope of finding a permanent outlet for surplus farm products after the war lies in the production of synthetic rubber. This problem of surplus is so close to the farmer's heart and pocketbook, that any medium of disposing of it will be defended strongly by the powerful farm lobby.

As we said earlier, there is really no call at this time for any decisions on the status of the synthetic rubber industry after the war. Like water, the industry is bound to find its own level. Then, too, in view of the fact that it will take long, long months, and probably years, to restore the natural rubber productive capacity of the Far East after the war, plus the fact that the pent up demand for civilian rubber goods will result in a production flow that will probably double the pre-war consumption of rubber, no decision to restrict synthetic rubber production in this country will be required for years to come after the conclusion of hostilities.

CURRENT NEWS OF THE MONTH

CRUDE RUBBER PRICES FOR MILITARY USE RAISED SUBSTANTIALLY BY RUBBER RESERVE

AT THE TIME the Office of Price Administration announced the reduction of prices for synthetic rubber produced in Government-owned plants to 36c per pound for GR-S (Buna S), 33c for GR-I (Butyl), and 45c for GR-M (Neoprene), as related in our last issue, it was also announced that the selling prices of crude rubber distributed by the Rubber Reserve Co. would be increased for all uses other than civilian goods, based on a price of 40c a pound for 1X ribbed smoked sheets. Since that time (March 8), Rubber Reserve has issued its new price schedules for crude and synthetic rubber, balata and latex. These prices, as well as the new rules and regulations covering the distribution of rubber, all of which was incorporated in Circular No. 17 of the Rubber Reserve Co., are reproduced in full in this issue on Pages 70 to 74, inclusive.

Under the new schedules, the price of plantation rubber for other than civilian use ranges from 40c per pound for 1X ribbed smoked sheet to 43⅞c for some specialized grades, comparing with 22½c and 26¼c, respectively, for rubber for civilian purposes. Wild rubber prices have been stepped up in approximately the same ratio, that is, approximately double the cost for non-civilian use as compared with civilian use. The price of balata is the same for either category, but the latices have been substantially increased, normal latex for other than civilian use selling at 43½c per pound in tank car lots. No price has been set on Government-owned synthetic rubber for civilian use, since no such use is as yet permitted.

Permit 60-Day Inventory

Manufacturers, under the new regulations were permitted to build up a 60-day working inventory of rubber as of March 31 providing they filed their requests with the Office of the Rubber Director by April 1. Thereafter, owing to the necessity of balancing and conserving the stockpile, and the uncertainty as to the types and grades which will be available, purchase permits for crude rubber will show only the total amount of rubber authorized by the Rubber Director, and the selling price will not be specified thereon. The terms "Civilian" or "Non-Cilivian" will appear on the purchase permits to designate the applicable price.

The price of crude rubber fixed in the new schedule is said to reflect only in part the higher costs of imported crude from the sources still available. The new prices will not require increased price ceilings for civilian goods since sufficient rubber will be made available to manufacturers of permitted items to enable them to sell finished products within established price ceilings.

In view of the fact that higher price ceilings will be set within the next few weeks for direct and indirect sales of rubber products to the Federal Government, based on the higher cost of rubber for other than civilian uses, OPA issued amendments to five separate rubber regulations on March 29 authorizing sales agreements for future delivery of rubber products for the Government to be made for prices higher than maximum currently in effect.

The amendments were: Amendment 5 to M.P.R. 300 (Drug Sundries); Amendment 6 to M.P.R. 220 (Certain Rubber Commodities); Amendment 8 to M.P.R. 149 (Mechanical Rubber Goods); Amendment 7 to M.P.R. 157 (Textiles, Apparel and Related Articles for Military Purposes); and Amendment 2 to M.P.R. 119 (Original Equipment Tires and Tubes). Later, commodities made in whole or in part of crude rubber which are priced under the General Maximum Price Regulation were added to those which sellers may contract to sell at prices higher than present ceilings. This was accomplished by Amendment 156 to Supplementary Regulation 14 of G.M.P.R.

Two other changes were made in Amendment 2 to M.P.R. 119 (Original Equipment Tires and Tubes). One is that tires and tubes made wholly or in part of Buna S synthetic rubber sold for the original equipment of vehicles that the War and Navy Departments, Marine Corps, Coast Guard or Maritime Commission has contracted to buy are exempt from price control until June 1, 1943. This is to facilitate experiments being made with such tires and tubes, and also to afford OPA time to obtain information needed before fair maximum prices can be determined for them.

The other change provides that the Defense Supplies Corporation pool charge may be added to prices for passenger-car original equipment tires and tubes when the seller has paid the charges. Until now tires and tubes were being newly manufactured for original equipment, and no pool charges were paid. Currently, however, the War Production Board prohibits manufacture of passenger-car tires and tubes for original equipment to meet current demands, so that the tires and tubes are being obtained from the DSC pool.

Jeffers Talks Retirement

Rubber Director William M. Jeffers has indicated in recent statements that he would like to resign his government post and return to the railroad business about July 1. He made it equally plain, however, that he had no intention of retiring before the rubber program was assured of success. He warned the public not to get too enthusiastic over the success of the program yet, since many uncertainties lie ahead.

In many quarters, Mr. Jeffers' hints about retirement are indicative of the fact that the synthetic rubber program, despite some "bugs" still to be ironed out, is proceeding smoothly and no additional major hitches are anticipated. The Rubber Director has a well-earned reputation for seeing things through and it is believed that he would not even bring up the subject of his possible early resignation unless everything was flowing smoothly.

On April 7, Mr. Jeffers flatly stated his belief that a synthetic rubber industry will be developed in the United States which will make this nation completely independent of all foreign sources after 1944. He vigorously opposes any plan to liquidate the government-owned synthetic rubber plants in the post-war period, thus expressing complete disagreement with Vice-President Henry Wallace. The latter favors limiting synthetic rubber production after the war unless the industry is able to compete economically with crude rubber without the benefit of any tariff walls.

Rumors in Washington to the effect that the synthetic rubber program was moving "better than expected" has led to new proposals that the high priority ratings recently assigned to the program, after a bitter fight by the Rubber Director, be reduced to speed the construction of escort vessels, vitally needed in the

anti-submarine warfare. Some military and naval officials are talking about cutting back a part of the rubber program authorized by Director of Economic Stabilization Byrnes. Although no official action has been taken, an early ruling is anticipated from Donald Nelson.

Russian Mission Returns

The return of the special mission sent to Russia last November at the invitation of the Soviet Government to study the Russian technique of producing synthetic rubber has returned to the United States, it was announced on April 6. The mission consisted of Dr. W. A. Gibbons, Dr. Aristide Grosse, Ernest Dittman, and Irwin L. Murray.

Before any announcement will be made as to the result of their visit, the members of the four-man mission will consult with the technologists of the Office of the Rubber Director and hold discussions with a reciprocal Russian mission now in this country studying our American methods of manufacture.

Incidentally, Rubber Director Jeffers stated on April 7 that the tire equipment purchased from the Ford Motor Co. for trans-shipment to Russia has not yet been shipped. No statement on the delay was forthcoming.

Scout Jap Rubber Reports

Consistent reports that the United States is receiving a substantial share of the crude rubber now in Japanese hands were dismissed as "fantasy" by spokesmen for the Rubber Reserve Co. and other government agencies on April 9. The reports were to the effect that Russia has been allowed to buy crude rubber from the East Indies in exchange for continued fishing rights off the Kamchatka Peninsula. This rubber, in turn, according to the rumors, was being transhipped to the United States.

Some officials conceded that small quantities of crude rubber, smuggled out of Japanese-held territory in the holds of Chinese junks, may be reaching Australia, but they said the poundage would be too small to make any impression on the shortage.

Chinese junk owners have been reported buying crude rubber in Penang or Singapore at 1 cent a pound and smuggling it on infrequent and risky trips to Australia, where they get as much as $1 a pound for it. The necessity for hiding the rubber, however, is said to limit cargoes to a maximum of 1,000 pounds a trip.

Lend-Lease Administration officials said they would have had to make arrangements for the shipment of rubber from Russia to this country and denied that they had concluded any such agreement.

"We see no ethical reason why we shouldn't use rubber from Japanese-held territory if we could get it through Russia," one high official of the Rubber Reserve Co. said. "The report that we are getting rubber that way is too good to be true."

12,000,000 Tires for Cars

Appearing before the Senate Small Business Committee on April 8, Rubber Director Jeffers stated that 12,000,000 new passenger car tires will be available for distribution in 1943 as compared with only 3,474,000 last year. He said that 7,000,000 new passenger tires are already on hand and that the other 5,000,000 will be manufactured from "synthetic rubber and otherwise." In addition, he said, 6,300,000 new truck tires will be distributed this year as against 3,525,000 in 1942. According to the Director, some 1,800,000 new truck tires are on hand.

RUBBER MACHINERY UNDER CONTROL; OTHER INDUSTRY REGULATIONS

Orders affecting the manufacture, sale and pricing of various rubber products, as well as new allocation regulations, issued in recent weeks, are related below under commodity headings for convenience:

RUBBER MACHINERY

General Limitation Order L-143, which covered tire and tube processing machinery and equipment only, has been revoked and has been superseded by Order L-143-a. The new order, issued on March 27, places all rights to acquire, manufacture, deliver, re-condition and rebuild rubber processing equipment of all kinds under the control of the Office of the Rubber Director. Eighty-one types of processing machines and equipment, divided into five separate groups, are covered in the order.

All manufacturers and dealers in rubber processing machinery and equipment, under the terms of the new order, must file lists of unfilled orders on their books as of March 26 and must obtain specific authorization from WPB before any additional deliveries can be made. No such machinery may be produced without authorization in the future.

DRUG SUNDRIES

Wholesale prices for rubber drug sundries when sold by dental, surgical, and hospital supply houses were removed from the rubber drug sundries regulations until June 1, 1942, on March 26, with the exception of prices for "Victory" line sundries that are subject to WPB standards. Until June, the wholesale prices of the goods sold by the supply houses will be subject to the General Maximum Price Regulation, but retail prices of the same sundries they sell will continue subject to the rubber drug sundries regulations and are unchanged. The actions were taken in Amendment 4 to M.P.R. 301 and Amendment 4 to M.P.R. 300, both effective March 26.

The amendment to M.P.R. 301 also freed two more types of specially constructed baby feeding nipples from the requirement that no baby feeding nipples shall be sold at retail for more than 10c each or 25c for three. These are the "screw on" and "cleft palate" types. It also provides that any other specialty constructed baby nipples are exempt from the same limitation even though they are not named in the regulation.

MECHANICAL GOODS

Mechanical rubber goods whose rubber content is more than 50% of balata by weight were made subject to M.P.R. 149 (Mechanical Rubber Goods) by OPA on March 30. The action was taken because balata is now being sold at or below prices in effect on October 1, 1941, the base date of the bulk of the commodities affected by the regulation.

Previously, mechanical rubber goods whose rubber content is principally balata were under M.P.R. 220 (Certain Rubber Commodities). They have been removed from control under that regulation by the issuance of Amendment 5 to the regulation and transferred to the mechanical goods classification under Amendment 7 to the latter regulation. Both amendments were effective April 5.

RUBBER JAR RINGS

Inasmuch as provisions of Conservation Order M-119, which prohibited the use of rubber jar rings or rubber sealed closures in packaging a number of products, have been incorporated in a new order, Conservation Order M-104, Order M-119 was revoked by WPB on March 30. Conservation Order M-104 specifies the limits within which closures for glass containers can be used for packaging foods, health supplies, chemicals, household and industrial products, and beverages for civilians.

A new type of closure, now being manufactured in quantities, is expected to provide plenty of metal closures for the expanding home-canning program. It is a three-piece unit, consisting of a heat-resistant glass lid, a rubber ring, and a metal screw band. Both metal band and glass lid may be used over and over, but the rubber sealing rings must be replaced from time to time.

SCRAP RUBBER

Scrap rubber articles bought to be repaired or reconditioned so as to be capable of their original use need not be sold at scrap rubber prices, according to Amendment 4 to R.P.S. 87, as Amended (Scrap Rubber), issued by OPA on April 7. Thus, tires and tubes

for automotive vehicles bought to be repaired and used as such come under the price regulation for used tires and tubes and not under the scrap rubber schedule.

The amendment states that the schedule shall not apply to any scrap rubber articles or material acquired for the purpose of making them reusable for their original purpose, even though they may be acquired together with scrap rubber covered by the schedule.

VULCANIZED OILS

Slightly increased ceiling prices for unmolded vulcanized vegetable oils (factice) to take into account higher costs for oils used in its manufacture has been permitted by OPA through the issuance of Amendment 135 to Supplementary Regulation 14 under the General Maximum Price Regulation. The amendment was effective March 14. Under the order, the Stamford Rubber Supply Co. is allowed to reflect 70% of its increased cost in its prices; Carter Bell Manufacturing Co., 80%; and the Tyson Co., 100%. A statement accompanying the amendment indicated that sales of these vegetable oils in 1941 amounted to approximately $1,000,000, representing a 70% increase over sales in 1939, while the 4,000 short tons produced represented a 67% increase over 1939.

A method for computing molded vulcanized vegetable oils, very little of which is used in the rubber industry, is included in Amendment 139 to Supplementary Regulation 14 under the G.M.P.R. The amendment, issued by OPA on March 24 and effective March 30, applies only to individually molded vulcanized vegetable oils that require special hand labor, and excepts truss pads which are covered under the rubber drug sundries regulation. Ordinarily, little hand labor is used in making the molded product (generally used in erasers), but the industry has recently developed such products as cushions for billiard balls to replace rubber, these specialty products requiring more hand work than formerly.

MISCELLANEOUS ORDERS

Dollars-and-cents margins for sellers of two specified types of cotton cloths used by the electrical and rubber industries—insulation cambric and separator cloth—were established by OPA on April 6 with the issuance of M.P.R. 358. The regulation applies to all sales except retail sales, with the exception of friction tape, any fabric covered by M.P.R. 149 (Mechanical Rubber Goods) or M.P.R. 220 (Certain Rubber Commodities), or any fabric which is not cotton.

Non-essential uses of certain specialty papers used in wrapping, specifically glassine, greaseproof and vegetable parchment, has been prohibited through the issuance of General Conservation Order M-286 by WPB on March 17. The prohibition applies to rubber and rubber goods, except when sterilized in the package.

TWO MORE COPOLYMER PLANTS GO INTO ACTIVE PRODUCTION

Two additional government-owned synthetic rubber plants have gone into operation in the past few weeks, one at Institute, West Virginia, and the other in Baton Rouge, La. The Institute plant will be operated by the U. S. Rubber Co. and that at Baton Rouge by the Copolymer Corp.

The Institute plant, which will have an eventual capacity of 90,000 tons annually, is the world's largest synthetic rubber plant under operation by one company. It is the second plant put into operation by U. S. Rubber in the government program, the other being located in Connecticut. According to J. P. Coe, general manager of the company's synthetic rubber division and of the Naugatuck Chemical Division, the company expects to have a third plant in operation in the near future. This latter plant will be located in the West and will be operated jointly with another company.

The plant at Baton Rouge was completed one month under schedule. It is a 30,000-ton unit and was constructed in three and one-half months. The plant was built by the H. K. Ferguson Co., under the supervision of the Firestone Tire & Rubber Co. Equipment for both the Baton Rouge and Institute plants was installed by the Blaw-Knox Co. The Copolymer plant will secure its butadiene from the Standard Oil Co. of Louisiana and the U. S. Rubber plant from the Carbide & Carbon Chemicals Corp.

Bulletin on Thiokol N

A bulletin containing technical information on GR-P (Thiokol N) has been prepared by the Educational Committee of the Office of the Rubber Director with the help of the Thiokol Corporation. GR-P is now being handled by the Rubber Reserve Co. It is suggested that manufacturers desiring technical help on the application of the new synthetic, currently being manufactured by DuPont, communicate with Dr. H. E. Simmons, of the Office of the Rubber Director. Information available will be furnished and possible sources where further assistance may be obtained will be suggested.

According to a spokesman for the Office of the Rubber Director, authorization for the unrestricted use of Thiokol N is contemplated, and the final decision will largely depend upon the response received from the industry as to the amounts which may be used and the end products which would be manufactured. In the opinion of the spokesman, many worthwhile end products can be produced successfully from the new type Thiokol.

Government Synthetic Tire

Completion of the first synthetic rubber tire to be made entirely of government-produced materials was announced by Goodyear on April 1. The synthetic rubber was manufactured in the government-owned Goodyear-operated copolymerization plant in Akron, the butadiene coming from the government plant operated at Institute, West Virginia, by Carbide and Carbon, and the styrene from a similar plant operated by the Monsanto Chemical Co. in Texas City, Texas. The tire itself, which was exhibited in Washington by Rubber Director Jeffers, was made in one of Goodyear's Akron plants.

Butadiene Developments

According to Herbert Henderson, chairman of the Neches Butane Products Co., the huge butadiene plant at Port Neches, Texas, will go into operation this summer, if deliveries of critical materials continue without interruption. Full capacity production will probably be reached before the end of the year, he added. Five major oil refiners organized the Neches concern.

The new 10,000,000-gallon grain alcohol plant to be erected in Keokuk, Iowa, will be operated by a subsidiary of the Consumers Cooperative Association, known as the Farm Products Cooperative Association, it has been reported. Plans are already being drawn for the production of non-military products in the post-war period.

A short strike for higher wages was staged at the Kobuta butadiene plant of the Koppers United Co. near Beaver Falls, Penna., early this month. Called by some 1,600 A.F. of L. unionists, the strike was amicably settled in a few days.

Miscellaneous Orders

Certain hydrocarbon fractions and components used in the manufacture of high-octane gasoline and synthetic rubber have been exempted from price controls by OPA. The exemption was incorporated in Amendments 86 to R.P.S. 88 and Amendment 57 to Supplementary Regulation 1 to G.M.P.R. While some of the materials had been removed from price control provisions by previously enacted amendments, some inadvertently had been left under the regulations.

Polystyrene has been placed under complete allocation through issuance of Supplementary Order M-170-a by WPB on April 4. The order is effective May 1. Polystyrene is defined as polymers of styrene (vinyl benzene) but does not include the copolymers of styrene with other monomers, such as butadiene or methyl methacrylate.

GUAYULE PROGRAM CURTAILED IN FAVOR OF FOOD CROPS

The Guayule Emergency Rubber Program, legalized by Congress, is being curtailed in order to minimize interference with the production of food crops. The curtailment was announced on March 30 in a joint statement by Rubber Director Jeffers and Secretary of Agriculture Wickard.

Since the guayule program was inaugurated, and expanded at the instance of the Baruch Committee, the need for maximum food production has become more pressing, Secretary Wickard stated, and the outlook for synthetic rubber has become somewhat clearer, according to Director Jeffers. The Rubber Director expressed the belief that it was not necessary or desirable to ask that the guayule program be carried on in such a way as to divert any large quantities of land and manpower from the production of food crops, particularly since 1945 is about the earliest time at which any appreciable quantities of rubber could be produced even under forced methods.

As a result Secretary Wickard stated that most of the high grade, irrigated land leased but not already planted to guayule will be turned back to the owners immediately, if possible, or subleased for food production. Most of this area is in California. As much of the remainder as practicable will be planted to guayule, adding to the approximately 11,000 acres already planted; and at Director Jeffers' suggestion part of the guayule nurseries will be resown so as to have planting stock available in the event that further survey of the rubber situation by mid-summer should require a renewed emphasis on the guayule program.

Meanwhile no further lands are being leased for the rubber project. Certain features of the program having to do with exploration of the localities suited to guayule cultivation, the best methods of growing guayule under cultivation and improvement of extraction processes to obtain a higher-grade rubber product will be continued. The mature shrub acquired by the government last spring near Salinas, California, is now being milled at the government-owned factory near that point to produce an estimated quantity of about 600 tons of rubber this year.

(EDITOR'S NOTE: Congress authorized the planting of 75,000 acres to guayule in the Western Hemisphere on March 5, 1942. Later, based on the rapid progress made in the program, this authorization was extended to the planting of 500,000 acres. An investigation of the curtailment order is believed pending).

Urge Higher Crude Prices

Huge quantities of crude rubber from Latin America could be moved to the United States quickly if the price paid was raised to $1.00 a pound, according to a statement made by Eduardo Lopez, brother of the president of Colombia, on March 27. Mr. Lopez, currently visiting this country, said that Colombia has four major rubber tracts, one of which alone supports about 7,000,000 trees, and the number of trees in the country has been placed at nearly 50,000,000. The only solution to Colombia's rubber problem is an "adequate" price, according to Mr. Lopez.

An appeal for higher prices for rubber and other necessary raw materials from Latin America was made by Dr. Cesar Gordillo Zuleta, Director General of Public Health of Peru, who is also in this country on a visit. Although large sums are being spent to make the work in the jungle more attractive to Peruvian labor, the prices being paid by the United States for the materials "barely cover the costs," he stated. Mr. Gordillo revealed that 2,500 workers are now in the Peruvian rubber zone and plans call for an ultimate 25,000.

On March 7, Douglas H. Allen, president of the recently-formed Rubber Development Corp., who is now in Brazil on a tour of inspection, predicted that the United States would get between 35,000 and 40,000 tons of rubber this year from Brazil, Peru, Bolivia and Colombia, and about 70,000 tons in 1944. It is now costing Rubber Development between 65 and 70 cents a pound to import rubber from Latin America, Mr. Allen revealed.

Latin-American Developments

The following reports on the progress of rubber cultivation in Latin America have been received in recent weeks:

Brazil: Some twenty camps have been constructed or projected at various points along the movement of men into the rubber zones and at principal concentration points up the Amazon and its tributaries. These include central collection centers and way stations, with capacity for handling up to 5,000 men. According to present plans, a "task force" will soon begin dropping men by parachute into the jungle areas from planes based on Manaos. Reports are current that Germany is spreading agents throughout the northeastern section with instructions to discourage rubber workers from going into the Amazon region. The quota of 50,000 rubber workers planned for this year will fall short, it has been stated, primarily because of the lack of shipping transportation.

Costa Rica: The Inter-American Institute of Agricultural Sciences in Costa Rica has been organized with funds provided by the Office of the Coordinator of Inter-American Affairs. The Institute will investigate a number of tropical-grown products, including rubber. Headquarters are maintained at Turrialba.

Honduras: A guard of "practicantes," or medical technicians, is being organized to accompany rubber tappers into the remote rubber-growing regions. They will protect the tappers against malaria, dysentery and treat snake bites, etc., and will patrol the rubber country from strategically-located bases or camps. The project for the protection of the tappers was worked out by American and Honduran doctors.

Mexico: The BEW recently sent a mission to Mexico to look into the possibility of increased Chilte production to help meet the demand for rubber. Chilte, also known as Sinoloa Gum, is a bush-like tree which apparently is found only in western Mexico. Normally, it is impractical to produce Chilte in competition with Hevea rubber, but specialists now see a market in the United States. Chilte was produced and used during and immediately after the first World War. It has a high resin content and is considered particularly adaptable for blending with synthetic rubber. The Chilte trees are tapped like other rubber trees.

Panama: A production rate of 400 tons of rubber annually is predicted once the rubber program is fully organized. Some rubber is already moving by air transport to the United States. Panama's rubber comes chiefly from the Castilloa tree, the average tree being tapped twice a year and yielding from one to three pounds with each tapping. Rubber men familiar with Latin American forests claim Panama has more trees in relation to its size than any other Caribbean area.

Peru: An extensive system of health services and food supply is now being developed to care for an expected rubber-gathering army of 15,000 men. There are about 1,500 now actively engaged in gathering wild rubber and thousands more are expected to swell the ranks in the next few months.

TIRE AND TUBE ALLOTMENTS NOW MADE ON A DISTRICT BASIS

Effective with the month of April, the allotments of tires, tubes and recapping services will be broken down into quotas on a district basis rather than on the state basis heretofore used, OPA announced on March 31, at the same time issuing the quotas for April.

The total of quotas for the 109 districts provided is directly comparable with the preceding month's totals for the 48 states and the District of Columbia, but since some of the districts cross state lines and include fragments of two or more states, there is no accurate basis for comparing the April quota figures for the individual districts

with the quotas as reported for each state separately in March.

District quotas of Grade I passenger car tires for April amount to 506,000, which compares with 321,827 in March, the figures for Grade II tires being 552,000 and 253,000, respectively, and those for Grade III tires 598,000 and 644,000, respectively. The increases reflect recently announced changes in eligibility and greater seasonal demand for replacements.

April truck tire quotas are 368,000 against 299,000 in March, and truck recapping service quotas are 552,000 against 460,000. The farm tractor and implement tire allotment of 59,800 for April is the same as for March. Inner tube quotas for passenger cars amount to 736,000 against 735,914, and for trucks to 338,100 against 292,100.

Release Wide Base Tires

The release from inventory of enough wide base tires to equal the amount of parts in manufacturers' hands to complete fabrication of between 13,000 and 14,000 farm tractors, was announced by Rubber Director Jeffers on March 20. This action, designed to balance out the wide base tires in inventory and the parts already in manufacturers' hands, will not require new production of rear, large-sized tires, but will only necessitate manufacture of between 3,000 and 4,000 small front wheel tires to complete the machines.

In a letter to Price Administrator Brown on April 5, the Rubber Director expressed concern over the apparent notion that "there is no longer need for conserving rubber" and suggested that rationing boards be admonished "to curtail driving as nearly as possible to that which is essential." Alarmed over reports that motorists are stepping up speeding, Mr. Jeffers addressed an appeal on March 23 to the governor of each state requesting cooperation in holding the speed limit to a maximum of 35 miles per hour, warning at the same time that tires recapped with unrationed reclaimed rubber camelback are apt to fail at high speeds, thus causing accidents. Mr. Jeffers also endorsed car-sharing as an efficient, economical and necessary means of war-time transprotation during the month.

According to Paul M. O'Leary, deputy administrator of OPA in charge of rationing, expert tire examination under the periodic inspection program has disclosed the need of recapping and repairs to many drivers who had thought their casings in perfect condition. In this same vein, the Office of War Information issued a statement on March 21 warning car owners that they must have their tires recapped at the right time to keep necessary automobiles on the road during 1943.

Revive Hearings on Bill

The Senate Small Business Committee, of which James E. Murray, of Montana, is chairman, has resumed hearings on S-2560, the so-called Rubber Tire Bill which would place all retail distribution of tires in the hands of independent dealers. The committee is considering the bill as a matter of permanent regulation rather than strictly as a war regulation only.

The initial hearing, held on April 5 in Washington, developed into a nip-and-tuck contest between independent tire dealer and so-termed company-owned and chain stores. Witnesses included Howard N. Hawkes (U. S. Rubber), J. W. Whitehead (Norwalk Tire), F. M. Judson (Sears-Roebuck), O. M. Gallaway (Montgomery-Ward), and a number of independent tire dealers.

Mr. Whitehead charged that the competition offered by company-owned stores to independent dealers, probably 80% of whom must buy their requirements through these same manufacturers, has become such that "the independent dealers' profits have been reduced to where they have been unable to extend the service necessary to prolong tire life."

Amendments to Ration Order

Eight additional amendments to Ration Order 1A (Tires, Tubes, Recapping and Camelback) have been issued by OPA since our last issue, as follows:

Amendment No. 16, issued on March 16 and effective April 1, provides for the release of pre-Pearl Harbor and "Victory" Tires to "B" and "C" gasoline card holders for replacement of tires worn beyond the recapping stage.

Amendment No. 17, issued on March 19 and effective March 25, restricts the recapping of farm tractor and implement tires to a material made almost entirely of reclaimed rubber and states that replacements will not be issued for any such tires that are recappable.

Amendment No. 18, issued March 24 and effective March 30, provides that rationing certificates for tires and tubes may hereafter be used at any time convenient to the holder rather than within the thirty day period previously allowed.

Amendment No. 19, issued March 26 and effective April 15 (later changed to April 9 by Amendment No. 21), makes possible a greater number of sales outlets for the convenience of farmers by enabling tire dealers or persons selling or servicing farm equipment who need rear-wheel tractor tires to serve their customers to bring their inventories up to six such tires.

Amendment No. 20, issued March 31 and effective April 6, excuses vehicle manufacturers from reporting inventories of unmounted tires and tubes to OPA, since they now must make similar reports periodically to WPB.

Amendment No. 22, issued April 7 and effective April 13, makes retail milk delivery vehicles eligible for replacement tires when present casings are not recappable by transferring such vehicles from the "B" to the "A" eligibility lists.

Amendment No. 23, issued April 9 and effective April 15, contains revisions designed to provide a closer check against bootlegging and violations of tire inspection requirements, including the regulation that the tire inspection record for each car must be kept in the vehicle while in operation unless its removal is authorized by OPA.

Tire Price Actions

Separate maximum wholesale and retail prices for factory "second" new rubber tires and tubes for passenger automobiles and trucks were established by OPA on April 2 by the issuance of Amendment 9 to R.P.S. 63 (Retail Prices for New Tires and Tubes) and Amendment 4 to M.P.R. 143 (Wholesale Prices for New Tires and Tubes). Applying to manufacturers' and private brands, the new prices are for tires and tubes which are less than perfect, and are based on discounts of 20% for truck tires and 25% for the rest, from the maximum prices for perfect new tires and tubes.

A minimum discount to dealers of 25% from maximum prices for retreading or recapping tires was established by OPA on March 12. The action, covered by Amendment 1 to R.P.S. 6, as Amended (Retreading and Recapping of Tires), was taken because current discounts vary and in some instances have become so narrow as to threaten a price squeeze on the dealer. Discounts of more than 20%, but not more than 35%, that were in effect to purchasers of the same class on December 1, 1942, are established for those who allowed them.

Tire Preservative Paint

A new tire preservative paint, under the trade name of "Chexchex," was recently introduced by the Akron Paint & Varnish Co., Akron, Ohio. It is an elastic, flexible black finish, which contains the same antioxidant used in tire compounds. It gives a dense, solid black film which excludes air and sunlight from tire sidewalls, thereby retarding checking and cracking. It produces a dull rubber finish which has the appearance of a new tire and will remain indefinitely on tire sidewalls unless scuffed off against curbs or similar objects. "Chexchex" is also beneficial to other rubber articles, including garden hose, mats, running boards, etc.

Associated with Mexican Tire Plant

The United States Rubber Company has become associated with the Compania Hulera Mexicana S.A., of Mexico City, manufacturers of "Tornel" tires and tubes, according to an announcement made by the former company last month. U. S. Rubber will provide the Mexican factory with the benefit of its technical knowledge and experience and manufacturing supervision and in return will have available an established Mexican plant providing basic facilities for further development of its business in Mexico and for the manufacture of products under its trade names.

Northern California Group Meets

The recently-organized Northern California Rubber Group, of which Herman Jorden is president and George Farwell, secretary-treasurer, has held two interesting meetings in recent weeks. At a meeting held on February 25, the principal speakers were C. A. Carlton, manager of the development department of J. M. Huber, Inc., who discussed "Some Practical Aspects of Buna S. Compounding," and J. W. Crosby, sales manager of the Thiokol Corp., who outlined the latest developments in Thiokol. At the meeting held on March 25, at which approximately 50 members and guests were present, Dr. Kenneth Marple, of the Shell Development Co., spoke on the 'Chemistry of Synthetic Rubber," and Frank Durbin, of the Shell Chemical Co., presented a motion picture covering the manufacture of soft carbon black. A door prize, consisting of a $5.00 merchandise order, donated by the L. H. Butcher Co., and won by John Perona, of the Shell Development Co., was awarded at the last meeting. Table favors were also furnished by Shell Chemical.

Introduce Resilon Linings

Resilon, a resinous, thermoplastic material, said to be suitable for many corrosive applications, has been developed by the U. S. Stoneware Co., Akron, Ohio. The new material is described as a compound of readily available resins, hydrocarbon polymers, elasticators, and inert, non-porous fillers, blended and reacted together at high temperatures. The finished reaction product is hot processed into sheets of various sizes or into bulk form for troweling or "heat-and-pour" applications. It is non-porous and flexible, and will not crack at temperatures as low as —15° F. nor sag at temperatures as high as 170° F. It does not become tacky in use, nor will it chemically alter or deteriorate with age. It will adhere firmly to steel, concrete or brick with a bond in excess of 300 pounds per square inch.

Montreal Hears Benedito

John D. Benedito, of Canadian Resins & Chemicals, Ltd., was the principal speaker at a meeting of the Rubber and Plastics Division, Montreal Section, Society of Chemical Industry, held on March 12 at the Ritz-Carlton Hotel in Montreal. Taking as his subject "Vinyl Resins," Mr. Benedito discussed the properties and industrial applications of the vinyl series and described in some detail polyvinyl chloride, acetate, copolymers, alcohols and acetals. He gave special attention to the formulation of the copolymers which his company is now manufacturing in Canada. The group was also scheduled to have held its final meeting of the season on April 9. A report on this latter meeting will appear in our next issue.

Higbee Heads New Unit

C. W. Higbee, associated with the U. S. Rubber Co. since 1919, has been made manager of the company's newly-organized wire and cable department. A native

C. W. Higbee

of New Jersey, Mr. Higbee attended Rennsselaer Polytechnic Institute, where he graduated in civil engineering. He joined U. S. Rubber in the wire sales department at Bristol, R. I., where he later became factory superintendent. Subsequently, he was made assistant manager and then manager of wire sales.

Trolene—New Rubber Substitute

A new rubber substitute, called "Trolene," has been developed by the Russell Manufacturing Co., Middletown, Conn. Although the company is now in the process of gathering information from several companies who have and are experimenting with the new material, and no announcement concerning its origin or value will be made until such information has been collated, the company states that it has every reason to believe that Trolene is a practical material for use by rubber manufacturers either as a substitute or an extender. There is a possibility that Trolene may be an acceptable substitute for sponge rubber.

A branch plant near Muncie, Indiana, for the assembling of tractor blocks will shortly be opened by the St. Mary's Manufacturing Co., a Goodyear subsidiary. Moving this department to the new plant will enable increased rubber production at the parent plant in St. Mary's, Ohio.

A booklet describing the company's new "War-Formula Paints" has been issued by the Industrial Maintenance Division of S. C. Johnson & Son, Inc., Racine, Wisconsin. A color card is included.

New Rubber Standard Approved

The Standards Committee of the American Society for Testing Materials recently approved a revision of the Tenative Method of Test for Changes in Properties of Rubber and Rubber-Like Materials in Liquids (D471-40T). This method covers standardized procedures for determining volume changes of rubber, particularly the new synthetics, on immersion in solvents. The new method, which was first described by B. S. Garvey, Jr., of the B. F. Goodrich Co., in his paper on "An Immersion Test for Rubber Compounds," in the *A.S.T.M. Bulletin* of March, 1941, is more simple and rapid than the present procedure and gives comparable accuracy. The new procedure is quite accurate, fast and represents a clever use of glass tubing, selected rubber samples, solvent, and method of measuring.

Recommend Wage Increases

Recommendations for pay rises for production and maintenance workers in various rubber factories throughout the country, including the Akron plants of Goodrich, Goodyear and Firestone, were made late last month by the special panel of the War Labor Board assigned to hear the cases of the rubber industry. The recommendation in the Goodrich case, which will probably set the pattern for the industry, provides for an increase of 8 cents per hour to production and maintenance workers, retroactive to June 17, 1942, the date of the current contract between the company and the United Rubber Workers of America. The manufacturers are expected to protest the recommendations.

Turgum—Plasticizer and Tackifier

Turgum, a standardized blend of the essential constituents of the crude gum of turpentine, but freed from the usual contaminants and variabilities, has been introduced as a plasticizer and tackifier for GR-S (Buna S) compounds by J. M. Huber, Inc., New York City. It is a viscous, amber-colored liquid, with a specific gravity of 1.025 to 1.035. In addition to aiding pigment dispersion, Turgum is also said to develop some tack and excellent physical properties, including tear resistance. Its outstanding advantage over other types of softeners, according to the manufacturer, is the effect of inhibiting cut, or flex-crack, growth.

The Neptune Rubber Mfg. Co., now located in Norfolk, Va., which was established in 1896 by Seth R. Milbury, has announced that it is discontinuing operations for the duration.

An interesting booklet on the applications of its "SR-4 Strain Gage," has been issued under that title by the Baldwin Southwark Division of the Baldwin Locomotive Works, Philadelphia, Penna.

Discusses Vinylite Elastics

The principal speaker at a meeting of the Rhode Island Rubber Club, held on April 2 at the Narraganset Hotel in Providence, R. I., attended by approximately 100 members and guests, was J. R. Price, of the Carbide and Carbon Chemicals Corp. Mr. Price discussed "Vinylite Elastic Plastics," reviewing the manufacture, properties and applications of the relatively new materials which are replacing rubber in many uses. According to the speaker, the Vinylite plastics, when properly formulated and compounded for the purpose, resist oils and gasoline better than rubber, their tensile strength exceeds that of rubber when the two materials are of comparable hardness, and their flexing life is approximately the same. The special advantages of the plastic materials over rubber were emphasized by Mr. Price, who also outlined some of their disadvantages.

Syn-Tac—A New Plasticizer

Syn-Tac, a free flowing plasticizer for the styrene type synthetics (Buna S), has been introduced by the C. P. Hall Co., Akron, Ohio. The new plasticizer is said to improve tack, dispersion, tear and elongation.

A New lightweight decking material called "Dektred" has been introduced by Goodyear. Easily applied and long wearing, the new material can be used on metal, wood, concrete and other flooring surfaces. Tests have indicated it is unimpaired by cold but may soften slightly in high temperatures, returning to normal when the temperature is lowered.

The M. S. A. Goggle Cleaning Station has been announced by the Mine Safety Appliances Co., Pittsburgh, Penna. Designed for convenient wall mounting, the unit consists of a compact case equipped with Fogpruf, a lens cleaning and antifogging agent, and optical wiping tissues.

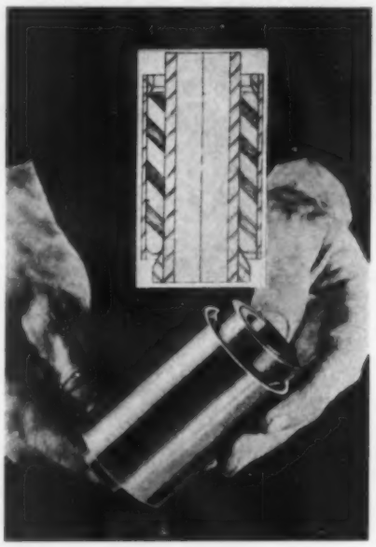
Leases for two large farms in Clifton, an adjoining community, have been signed by the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., in order to accommodate some 400 employees who wish to plant Victory Gardens this spring.

The Meehanite Metal Corp., and the Meehanite Research Institute of America, Inc., have announced the moving of their headquarters from Pittsburgh, Penna., to the Pershing Building, New Rochelle, N. Y. The new quarters feature enlarged laboratory and research facilities.

The Farm Service Bureau of the Firestone Tire & Rubber Co., Akron, is distributing a pocket-size garden guide book said to be of value to both experienced gardener and novice alike. The book is entitled "Helpful Information for Growing a Successful War Garden."

Rubberflex Engine Mountings

Rubberflex engine mountings, designed to insulate vibration, absorb shock and compensate for misalignment in heavy duty equipment, have been introduced by Bushings, Inc., Berkley, Michigan. The design of the mounting and



the principle of assembling the rubber wall between an inner and outer wall of metal is relatively new to this country, according to the manufacturer, and permits a reduction of approximately 17% of the rubber normally used for support mountings of the conventional type. The assembly is held together by a mechanical rather than chemical bond. Thus, the members are held together wtih the elasticity of the rubber which forms an insulating medium as well as the bonding member. This mechanical bond not only permits the reduction in the amount of rubber employed, but also allows the use of synthetics or reclaimed rubber. Proof against complete failure which would permit the engine to "fall out' entirely can be seen in the accompanying sketch. Loads that are far in excess of the rated capacity of the mounting must first equal to the shear strength of the rubber before the bond will "slip." Even should this occur, the engine would still remain operative, as the amount of "fall" would not exceed one-fourth inch and the support mounting would merely change from an "insulated" to a "solid" type of support.

The "A-B-C of Victory Gardens," an authoritative booklet on the growing of vegetables, is currently being distributed by the General Atlas Carbon Division of General Properties Co., Inc., Pampa, Texas. Copies are available free on request to the company.

An Index to Vol. 52 of RUBBER AGE will be found on Pages 95 to 98 of this issue.

Develop Polymerized Dispersion

Ubatex, a dispersed polymer at high concentration and low viscosity, so prepared that it gives a strong, flexible film, has been developed by the Union Bay State Co., Cambridge, Mass. Resembling latex in many of its properties, the new material has a particle size in the vicinity of four microns and of the order of fineness of latex particles. It has a pH of 9 and is therefore easily coagulated or "set" by acid surfaces, such as leather, thereby preventing undue penetration. However, like natural latex, reductions of concentration, aided by wetting-out agents similar to those used for latex, will give good impregnating compounds. Ubatex can be modified to cover a wide scope of applications.

Agicide Laboratories, Inc., has announced the removal of its Milwaukee plant to 1717 Taylor avenue, Racine, Wisconsin.

Plastic tubing which will resist pressures up to 40 pounds per inch when unbraided and up to more than 200 pounds per square inch when braided has been announced by Goodyear. It is especially adapted for breweries and creameries.

An index to the rubber chemicals literature issued by the company during 1940, 1941 and 1942, has been made available by the Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. Ask for Report No. 42-5.

United Carbon Co., Charleston, West Virginia, donated 20,000 cigarettes to the American armed forces reecntly.

A selected bibliography under the title "Books About Middle America" has been issued by the Middle American Information Bureau, 9 Rockefeller Plaza, New York City. The bureau is conducted by the United Fruit Co.

A new district office has been opened in the Girard Trust Building, Philadelphia, Penna., by the H. K. Porter, Co., manufacturers of industrial locomotives and process equipment. The new office will service Eastern Pennsylvania, Western New Jersey, Maryland and Delaware.

"Libraries" of copies of vested patents have been opened at the offices maintained by the Alien Property Custodian at 120 Broadway in New York City and in the Field Building in Chicago. Assistance in ordering copies of these patents and full information on securing licenses will be given at these offices.

"Tire Hints for More Mileage" is the title of a new brochure currently being distributed by the Customer Research Staff, General Motors Corp., Detroit, Mich. It consists of lists of "Do's" and "Don'ts."

Balanced

The preference for Standard Micronex in the compounding of natural, reclaimed and synthetic rubber is a reflection of its balanced characteristics.

MICRONEX

A COLUMBIAN COLLOID

BINNEY & SMITH CO. • **COLUMBIAN CARBON CO.**

DISTRIBUTOR MANUFACTURER

STANDARD MICRONEX

Standard Micronex has been developed over the years to meet the practical advances in the art of rubber processing. Thus it represents the balancing of many properties which include striking uniformity in mixing operations, working properties consistent with the processing conditions of good factory practice, and highest degree of uniformity in cure—all in addition to adequate reinforcement and only moderate heat build-up. These balanced characteristics of Standard Micronex take on increased importance in the present rubber situation.

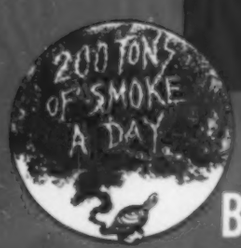
STATEX

THE BLACK OF TOMORROW, a new colloidal carbon for reinforcing natural and synthetic rubber contributes:
REINFORCEMENT — excellent resistance to abrasion.
COOL RUNNING — with high rebound, low hysteresis.
FAST CURING — high pH promotes vulcanization.

FURNEX

THE HIGH RESILIENCE BLACK contributes:
GOOD TENSILE STRENGTH in G R-S without loss in rebound resilience • HIGH LOADING CAPACITY • EASY AND SMOOTH PROCESSING • IMPROVED AGING.

COLUMBIAN COLLOIDS



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A.S.T.M. RUBBER COMMITTEE HOLDS MEETINGS IN BUFFALO

Specifications and tests for rubber products in which synthetic materials would be an important element were the main consideration at the series of meetings held by Committee D-11 on Rubber Products of the American Society for Testing Materials in Buffalo on March 3 in conjunction with the Society's Committee Week.

The main committee approved a classification of natural and synthetic rubber which is being published in the latest compilation of *A.S.T.M. Standards on Rubber Products.* These classifications represent the cooperative effort of A.S.T.M. and the S.A.E. in an effort to simplify the rubber compounding problem and have a minimum number of rubber specifications standards.

The Subcommittee on Mechanical Rubber Hose is conducting a letter ballot on an Emergency Alternate Provision to become effective in the Specifications for Cotton-Rubber-Lined Fire Hose for Public and Private Fire Department Use (D 296-38) providing for a use of the current Federal Emergency Specification E-ZZ-H-451a to be used during the war period. This action is considered necessary because of restrictions provided in the rubber limitation order.

Other Subcommittee Meetings

As usual in the work of Committee D-11 there was rather intensive activity in the field of rubber insulated wire and cable. An Emergency Alternate Provision has been effective for almost a year in the Specifications for Rubber Sheath Compound for Electrical Insulated Cords and Cables (D 532-39 T) setting up considerably less rigorous physical requirements. Some further modifications are to be made and the latest provision which is now in course of approval will provide that Section 2 of the specifications, requiring the vulcanized rubber sheet to be homogeneous in character, tough and elastic, and vulcanized in a metal mold, be eliminated.

Two important proposed new tentative specifications for synthetic jackets for wire, both involving the use of neoprene —one for light service, the other for heavy-duty service—have been drafted and have been submitted to the committee for vote. This is the first definite action to be taken by the committee involving synthetic rubber wire insulation. As soon as the committee approves it, it will be submitted to the Society for publication. The some Subcommittee is voting on a new specification for plyvinyl chloride type of insulation and is actively working on GR-S for jackets and insulation; other synthetics are also under consideration.

The Subcommittee on Packings held an interesting meeting with agreement being reached on proposed standard test methods for compressed asbestos sheets. It is expected the new method will be presented to the Society for approval at the A.S.T.M. annual meeting in Pittsburgh.

There was extended discussion on the present type of insulating tape covered by Emergency Alternate Provisions EA D 69 and as a result further changes are in prospect deleting requirements on use of rubber in this type of tape. A test program of new types of tapes now in use will be arranged.

Committee D-11 has a subcommittee on life tests and its section on aging has reviewed the oxygen aging method (D 572) and the oven method (D 573) in the light of their use on synthetic compounds and has concluded that the oxygen pressure method is satisfactory, but that for the oven method a number of higher temperatures must be established than the present 70° or 90° F. for materials for heat service. The committee strongly recommends that the number of these temperatures be held to a minimum and that where higher temperatures are desirable all such tests be confined to 212°, 250°, or 300° F. Further investigations will be made.

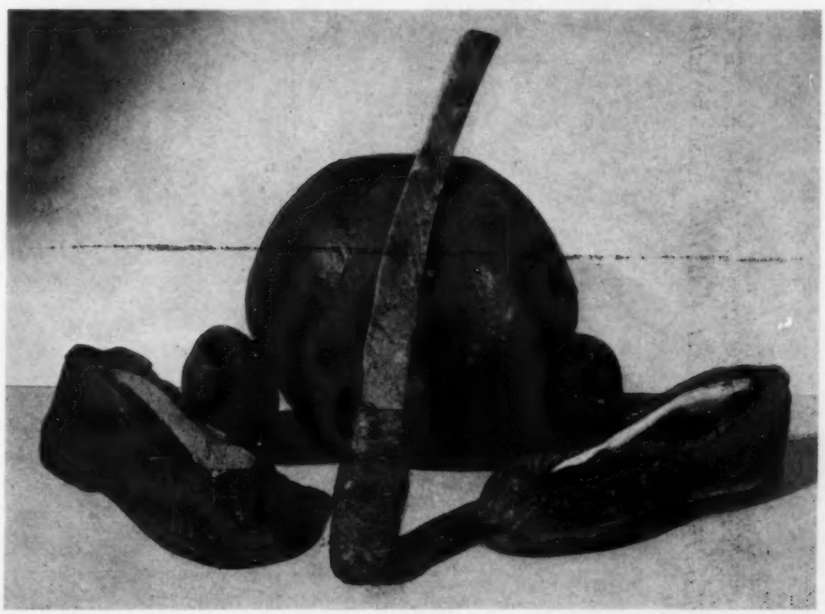
The subcommittee on liquid cements has organized two sections covering three types of adhesion or film strength tests: (1) Ultimate strength of film or bond; (2) Initial film strength; (3) Tackiness of cement films including wet strength and bonding range.

In 1939 a subcommittee on sponge rubber developed several tests for sponge rubber products which covered chemically blown sponge rubber, expanded cell-tight material, and foamed latex. A change in this method is now in course of approval so that the heating time in the compression set test applicable to sponge rubber shall be 70 hours instead of 22 hours at 158° F. and with this change the methods D 552 are to be recommended for adoption as a formal A.S.T.M. standard.

Subcommittee XXV on Low-Temperature Tests held an organization meeting in Buffalo. Four sections were organized to cover the following: (1) Brittleness at low temperatures; (2) Increase in modulus and hardness at low temperatures; (3) Loss in resilience at low temperatures; (4) Fatigue in flexing. Because of urgent need for some type of low-temperature test immediately, the subcommittee, pending completion of more detailed study, voted to recommend that the cold brittleness test sponsored by Technical Committee A be recommended as an A.S.T.M. tentative method.

Technical Committee A presented a specification incorporating the classifications of natural and synthetic rubber, certain details to be worked out and agreed upon in this committee. It was requested that submission to the A.S.T.M. through Committee E-10 on Standards be authorized immediately upon completion of these details after approval by Technical Committee A and letter ballot of Committee D-11. Technical Committee A is working on synthetic V belts and Subcommittee III is undertaking work on synthetic brake hose and synthetic oil and fuel hose.

COLLECTION OF RUBBER MISCELLANY ARRIVES FROM SOUTH AMERICA



The intensified efforts to revive and modernize South American jungle rubber sources have not yet eliminated some of the quaint items that were wont to pop up in shipments from that area. Culled from a recent shipment to the B. F. Goodrich Co. and now headed for the mixing mills in this typical collection of oddities—hand-fashioned rubber shoes, two small rubber water bottles, a knife with an improvised rubber handle, and a big rubber ball used in a native game called "batos."

SYMPOSIUM ON CURRENT COMPOUNDING AND PROCESSING PROBLEMS FEATURES ANNUAL SPRING MEETING OF NEW YORK RUBBER GROUP

An all-industry symposium on the present situation in various divisions of the rubber industry, covering late developments in compounding and processing, with emphasis on current major problems and how they are being met, featured the meeting of the New York Group, Rubber Division, A. C. S., held at the Building Trades Club in New York on March 19.

In addition, Paul S. White, director of public affairs and news broadcasts for the Columbia Broadcasting System, delivered an interesting after-dinner talk on "the news behind the news," during the course of which he conducted a question-and-answer forum. Approximately 300 members and guests attended the meeting, over 260 remaining for dinner.

The symposium featured speakers representing six branches of the industry: Footwear, Wire and Cable, Drug Sundries, Proofed Goods, Tires and Tubes, and Mechanical Goods. Abstracts of each of the six talks, especially prepared for publication by the respective authors, listed in the order of their presentation, follow:

Footwear—J. E. Robinson, Manager of Product Development and Control, Naugatuck Footwear Plant, U. S. Rubber Co., Naugatuck, Conn.

The rubber footwear manufacturing industry has been greatly affected by the emergency, but is still operating in such capacity as to meet the needs of our Army and Navy and the essential requirements of the country's civilian population. The manufacture of fabric upper, rubber soled shoes of the tennis or sneaker type has been discontinued, with the exception of the requirements of our Armed Forces. The production of essential waterproof footwear has proceeded and is proceeding at a substantial rate. This has been made possible with limited consumption of new rubber, by the elimnation of all colors other than black, by simplification of footwear lines, and by the elimination of all features and styles not required for their utility value. Most of all the continuation of production has been made possible by modern compounding, and particularly by the excellence and adaptability of reclaimed rubber.

Despite the increased demand for waterproof footwear from the Armed Forces, the industry's present rate of consumption of new rubber for this purpose is estimated on the basis of the present rate at about one third of the normal. While such marked reduction in new rubber usage must entail some lowering in quality, it is believed that the products as generally produced by the industry will provide very reasonable service. It is questioned if at any time the industry has produced as good a product with so little new rubber.

The rubber footwear industry has been alert to the fact this relatively small consumption of natural rubber must be replaced with synthetic rubbers, and has cooperated in the development of formulae and manufacturing methods. All rubber footwear manufacturers have made at least experimental production, using GR-S allotted by WPB for his purpose. Sufficient is now known that we can say with assurance that serviceable rubber footwear can be produced, although possibly at some increase in manufacturing costs. The shortcomings of GR-S include those of difficulty in plasticizing, and lack of natural tack. Present compounding for footwear is based on improving these features. Loadings of soft of thermal decomposition blacks are generally preferred to hard blacks, and are used in the proportion of 100% on the rubber hydrocarbon. Various and large amounts of organic materials have been employed to improve tack and handling properties. Typical of these are the products sold under the trade names of Cumar MH and Naftolen R-100.

Wtih reference to the other general purpose synthetic rubber which might be available, GR-I or Butyl, the industry has very much less experience, due to insufficient supplies of material. Due to its incompatibility with natural rubber, reclaim or other synthetics, and due to relatively more difficult vulcanization, it has not been greatly favored.

Wire and Cable—R. A. Schatzel, Director of Research, General Cable Corp., Bayonne, N. J.

The cable industry is beset by shortages of materials including copper, tin, aluminum, jute asphalts, lacquers and synthetic resins, as well as rubber, reclaim and synthetic rubbers. With this situation existing, the industry is required to produce more cable for operation under more exacting conditions than in peacetime. The common problem is, therefore, to make the best possible use of available materials and avoid waste caused by the use of materials with properties in excess of those required by the service conditions. By a critical analysis of the electrical and physical properties required in an insulation for a particular application, the appropriate material can be selected.

The restrictions imposed by WPB are based on this principle. As an example, high reclaim insulations are now designated for higher voltage applications than were permitted formerly. Also Vinyl elastomers are being used for insulations and jackets on Navy and Merchant Marine cables. Three of the current research problems are: (1) the effect of small percentages of residual soap and water solubles in GRS on electrical stability; (2) the type of GR-S polymer best suited for insulation use; (3) the evalution of Butyl rubber for electrical insulations.

With regard to specifications, many traditions must be overcome and requirements unrelated to service conditions must be revised. They are now being revised with a realistic viewpoint but we must be particularly careful to guard against similar mistakes in writing specifications for the synthetic materials. They must be treated as materials of value in their own right and not as rubber.

The use of reclaimed rubber by the cable industry has increased tremendously and the reclaiming industry is to be commended on the ability to produce the high quality material for the exacting uses of today. The use of neoprene and Vinyl polymers has also increased greatly and are making great savings of rubber possible. GR-S has been used experimentally and will probably have considerable use when knowledge regarding its processing, high speed vulcanization and reinforcement with non-carbon fillers has been increased. Only a very small amount of Butyl rubber has been made available to the cable industry and so far its chief disadvantage is its slow curing characteristics.

In regard to processing, probably the most important single development since the last war is the continuous vulcanization process. Its use allows the industry to meet the severe production demands of the present. However, this process necessitates stringent requirements on processing and better control methods. Many of the problems now involve the adaptation of new materials to this important manufacturing tool.

The following general characteristics in a synthetic rubber suitable for insulation purposes are desired by the cable industry: (1) processibility on rubber equipment with the minimum reduction of production efficiency; (2) Moisture resisting properties of the same order as rubber to obtain electrical stability. This necessitates the elimination of electrolytes and impurities; (3) Low temperature flexibility equal to rubber; (4) Heat resistance superior to rubber; and (5) Curing rate equal to rubber.

With modification and improvement of GR-S there is promise that this goal may be approached.

Drug Sundries—W. J. O'Brien, Chief Chemist, Seamless Rubber Co., New Haven, Conn.

A little over a year ago there was no reclaim rubber used at Seamless. After Pearl Harbor it became absolutely essential that we use very large quantities of reclaim. The outstanding result was the uniformity of cure and processing appearance which the addition of high-grade reclaim had given to our products.

Many extenders were tried and para coumarone indene resins were found to be very advantageous. In the case of surgeons' gloves made from liquid latex, a small amount of most any extender seems to deteriorate the tensile strength. The outstanding extender for surgeons' gloves

is dispersed crepe. Dispersed reclaim is a very good extender for industrial latex gloves.

To date the most promising synthetic latex appears to be neoprene. In the field of synthetic elastomers dispersions of vinyl butyral, either the thermo-plastic or the thermo-setting types, have failed to reveal the tensile strength which they showed in the dry state before dispersion.

Work with the dry synthetics in our plant started first with neoprene. We have found that neoprene works well on the mills and calenders. Some difficulty was experienced in sheeting neoprene in thin gauges. Where the cures were short, the extent of set-up or bin cure stock was considerable. Where the cures on the articles were long, the danger of compound curing was greatly reduced. Neoprene GN seems most suitable for sundries work and approaches rubber especially in its surface tack and cementability.

A small amount of work has been done on Butyl Rubber. This material makes an excellent bladder, though the curing problem has not been solved.

Difficulties with Buna S are low tensile, lack of build and seam tack, poor hot tear, and a tendency to scorch when very fast cures are required. Fine particle-size pigments are helpful. Carbon black is the best filler to use for tensile strength. However, in the manufacture of water bottles, it makes a very stiff article and of course the color is black. The plasticising of Buna S and the maintenance of tensile is a great problem. A well plasticised black Buna S of high tensile is hard to obtain. A well plasticised Buna S in light colors and of a reasonably good tensile is very difficult to obtain.

The synthetic which has given us the least difficulty in our plant is Buna N. The reprocessing of Buna N uncured returns also presents no problem. We have had difficulty with the processing of Buna S uncured returns which appear to soften considerably on reworking. The uncured returns from neoprene are invariable in the frozen state and present a refabrication problem.

The outstanding problems with synthetics are more difficult milling and calendering, slower extrusion and inferior tensile and "feel" to comparable rubber articles. It is towards the solution of these problems that we are directing our efforts at the present time.

Proofed Goods—R. R. Lewis, General Superintendent, Vulcan Proofing Co., Brooklyn, N. Y.

A recent statement by OPA claims that "the coated fabrics industry sells only the service it performs on fabrics." This is approximately correct and emphasizes the differences between the proofing branch of the rubber industry and other rubber manufacturers. The proofing branch operates like a department of a larger organization. Proofing comprises calender coating as well as spread coating but the real romance and skill are in spreader coating. The major differences between proofing and other rubber manufacturers are the following:

Proofers do not make finished articles, they are faced with a constantly changing market; for example, in years past major products changed from auto tops to raincoats to shoe fabrics to upholstery fabrics, these changes being dictated by demand as much as by proofing development, the large and important use of solvent, the emphasis on finish and appearance and the varying types of cures employed, such as heater cure, steam cure and sulphur chloride cure.

The change in the proofing industry from peace time to war time service has meant that no rubber can be used for commercial items and no rubber can be used for mitiltary items where other coating materials are capable of furnishing the necessary properties. The chief property for which rubber is still permitted is diffusion resistance, as in the manufacture of such items as balloons, life rafts, pontoons, boats, life vests, air mattresses and some other air holding and gas holding items. For these uses synthetic rubbers are better than natural rubber except in light colors.

For those materials such as garments, hospital sheeting, gas protective clothing and bags of various description, rubber or synthetic rubber have been replaced by synthetic resins or cellulose derivatives. The most widely used and most successful are the Vinyl resins, applied very easily by calendering and also suitable for spreader coating. Cellulose derivatives are being used to a lesser extent. The chief compounding problems are proper choice of pigments and plasticizers for temperature resistance. The chief manufacturing problem is adjustment of calender crown for increased plasticity at high calendering temperatures. These coatings will undoubtedly survive the war to replace rubber and cellulose in certain uses.

Reclaims are being used and satisfactory spreading stocks are being made with all reclaim. Problems in the use of the newer synthetic rubbers, such as Butyl rubber and Buna S have not been entirely worked out, particularly the cure of the Butyl rubber.

Tires and Tubes—O. J. Lang, Chief Chemist, Armstrong Rubber Co., West Haven, Conn.

The development of the GR-S tire is far from being complete and is a long way from approaching the state of perfection attained by the natural rubber tire. All tire companies are concentrating on the problem of producing the best possible tire from this material, and there are test fleets in continuous operation both private and for the Ordnance Department of the U. S. Army.

The principal weakness of GR-S in a tire tread is its tendency to continue to stiffen on aging, losing considerable of its elongation and becoming brittle. This embrittlement is considerably accelerated by heat. Therefore, under conditions of operation where heat is not built up, these treads will give good service. However, high speed operation, overload conditions, etc., develop heat and sooner or later the GR-S, especially if run on a road where it may be cut, tears and breaks away from the carcass. This embrittlement ties in with the naturally low tear resistance of GR-S tread stocks and causes early failures in many cases where heat service is encountered.

Another major deficiency in GR-S is that it builds up considerably more heat than natural rubber. This heat build-up affects the life of the carcass which is expected to carry the tread. It is for this reason that even rubber carcasses do not stand up too well under Buna S treads, and when Buna carcasses are used, their naturally low physical properties cause early failures when used in truck tires.

Generally speaking, heat build-up decreases with a tighter cure, but embrittlement becomes worse. Tear resistance increases with higher black, but this increases heat build-up. The life of the tire compounder with GR-S, therefore, is one of compromises—sacrifice some low heat build-up properties to get less embrittlement; use less black to get lower heat build-up, even though this sacrifices tensile strength and tear resistance.

Compounders evaluate the relative importance of these properties differently, so that at present there are many different schools of thought. There are adherents for high sulfur in the range of 3%, likewise for low sulfur in the range of 1-½%. The amounts of accelerator vary widely, as do the loading of carbon black.

With respect to acceleration, the opinions are not so divergent. Chiefly, the MBT type have been preferred either alone or in combination—Captax, Santocure, BJF, etc. There is some interest in the thiuram sulfides and laboratory-wise these accelerators have merit with respect to the flatness of the curing curve and also of the aging curve. Stocks made from these accelerators should not embrittle quite so rapidly and further work on them is being carried out.

We have touched briefly on the quality problems of the tires. The processing problems still remain a headache, principally the problem of lack of tack and the consequent necessity for cementing, plies, etc. The milling, calendering and extruding difficulties do not appear to be too great. We have not at our plant been able to attain the same degree of efficiency in the mixing of the GR-S as with crude rubber.

As a whole, progress is being made in the tire industry in the use of GR-S and while I am not optimistic enough to believe that tires equal to those from crude rubber will be made with the present polymer, I believe it will be possible to develop tires for most ordinary services from this material. The progress which has been made is remarkable, starting with an entirely new material and one which in addition to all its inherent weaknesses, has been non-uniform in deliveries

lot to lot and from producers to producers..

Mechanical Goods—J. P. Hayes, Plant Manager, Rodic Rubber Corp., Garwood, N. J.

In the change from crude rubber and reclaim to synthetics, the mechanical field again encountered all problems of re-educating and familiarizing the workers with new compounds as they did in changing from reclaim to rubber about ten years ago.

New problems arising with the use of synthetics include uncured tack and cured ply adhesion. None of the tackifiers available have been found to be completely satisfactory. Because large percentages of plasticizers are used, comprehensive study of properties such as volatility, vapor pressure and freeze resistance is required. The use of a plasticizer with low vapor pressure helps in maintaining the original physical properties.

In comparing plasticizers for resistance to freezing, it has been found that they do not necessarily fall in the same relative position when tested in Hycar OR as when tested in Perbunan.

Vinylite has now replaced rubber in typewriter rolls and is considered superior to rubber for this purpose. The processing of Vinylite with rubber machinery involves special attention in bearing lubrication because of necessarily higher roll and tubing temperatures.

As design engineers realize the improved physical properties of the various elastomers, their specifications are becoming more exacting with the result that rubber mechanical goods is now an engineering commodity.

U. S. Rubber Leases Buildings

Four buildings and the power house of the Hupp Motor Co., in Detroit, Mich., have been leased by the United States Rubber Co. to increase production of war products. Much of the Hupp space has already been converted and parts for the running gear of light and medium tanks are being turned out in volume. New installations of machinery are still being made, however, and an overhead conveyor system is being completed. When fully converted, the plant will become a major production unit for U. S. Rubber's war output. Two types of tank treads are being produced at the plant. These treads are being made by improved manufacturing methods, one of which is reported to take only one-third the time originally needed, at the same time saving 10% of the rubber once used.

A new booklet, titled "Bausch & Lomb at War," is being distributed by the Bausch & Lomb Co., Rochester, N. Y., in commemoration of the award of a third star to the company by the Army-Navy Board of Production Awards. The booklet gives some of the record on which the awards were based.

Coming Events

Apr. 30. Chicago Rubber Group, Hotel Morrison, Chicago, Ill.

May 4. Los Angeles Rubber Group, Mayflower Hotel, Los Angeles, Cal.

June 28-July 2. Annual Meeting, A.S.T.M., Wm. Penn Hotel, Pittsburgh, Penna.

Oct. 5-7. National Safety Council, Sherman, LaSalle and Morrison Hotels, Chicago, Ill.

SERVICE FACILITIES EXTENDED BY INTERSTATE WELDING SERVICE

Announcement of a new welding service for the rubber industry has been made by Interstate Welding Service, of Akron, Ohio. Through the acquisition of a new factory unit and the installation, just completed, of special welding and machining equipment in the new plant, they have broadened their service facilities to such an extent that all needs for the industry in specialized welding work or for the fabrication of welded metal products can be met adequately, according to Gordon A. McLean, its owner.

"This new service," says Mr. McLean, "is being operated as a separate unit with specially trained personnel, but under the competent direction of the engineering staff of our main factory unit. No change has been made in the set-up of our Banbury service, which has grown to considerable proportions as a result of war pressure on production. Our need for greater space and the urgings of our many clients to provide them with fabricating service on a broader scale have made expansion necessary.

War Brought Diversification

"War needs have introduced extensive diversification in the production of many rubber factories. Many of their problems are altogether foreign to rubber. The fabrication of metal parts and products in some cases has involved requirements difficult to fulfill out of their own specialized experience in plastic materials. Our new welding service has been established primarily with this need in mind. Our experienced personnel, both from an engineering and production standpoint, has already been of helpful service to some manufacturers in meeting the need for specially built parts for equipment as well as for direct assistance in fabricating products."

Interstate Welding Service stress the fact that their new service is supplemental to the Banbury rebuilding service which they have been providing for so many years. The additional service will enable them to meet the call for a much wider range of industry needs since it provides for the fabricating of welded metal products as well as the production and repair of equipment parts.

Scrap Dealers Elect Officers

Alex Schulman was elected president, A. Lowenstein, vice-president, and Charles Haskins, secretary-treasurer, of the Scrap Rubber Institute, a division of the National Association of Waste Material Dealers, Inc., at a meeting of the institute held on March 16 at the Hotel Sherman in Chicago. Julius Muehlstein, Nat E. Berzen, Irwin Desser, David Feinberg, E. B. Friedlander, Nat Lakin, and Samuel L. Bierman were elected members of the Executive Committee. The meeting was held in conjunction with the 30th annual meeting of the national association, of which Mr. Feinberg was re-elected president and Mr. Muehlstein elected third vice-president. Discussion during the meeting of the Scrap Rubber Institute brought out the fact that the Rubber Reserve Co. is not continuing to take a good deal of the so-called Victory Rubber accumulated by various salvage committees at the very favorable prices paid for such rubber when the program was initiated. This has presented a problem which will be taken up by the Institute with WPB officials.

Gibson Island Conferences Continue

The annual summer conferences initiated several years ago by the American Association for the Advancement of Science will be continued, with war topics stressed during the duration. The conferences cover chemistry and allied fields and are held on Gibson Island in Chesapeake Bay. The 1943 schedule follows: (1) Frontiers in Petroleum Chemistry, June 14-18; (2) Catalysis, June 21-25; (3) Organic High Molecular Weight Compounds, June 28-July 2; (4) Textiles, July 5-9; (5) Strategic Materials, July 12-16; (6) Hormones, July 19-23; (7) Vitamins, July 26-30; (8) Chemical Growth Promoters, August 2-6 (9) Corrosion, August 9-13; (10) Instrumentation, August 16-20. Neil E. Gordon is director of the conferences, and John C. Krantz, Jr., is assistant director.

Introduce Hycar OR-25

Hycar Chemical Co., Akron, Ohio, has announced the availability of a new type of Hycar Synthetic Rubber. Called Hycar OR-25, experimental quantities of the new type of rubber have been manufactured for the past nine months for one specific war application. It is reported to have greater low temperature flexibility and to be somewhat less oil resistant than Hycar OR-15. The same ease of processing and compounding, characteristic of Hycar OR-15, according to the manufacturers, are said to be retained in the new type. Because Hycar OR-25 is a new product, manufacturers are permitted under WPB regulations to purchase up to 25 pounds for experimental purposes.

TECHNICAL CLUB FUNCTIONING AT GATES RUBBER CO. PLANT

Three years ago a few members of the technical department of the Gates Rubber Co., of Denver, Colorado, banded together and formed the Gates Technical Club for the purpose of promoting a more universal interest in general technical matters related to rubber manufacture among the members of the technical department as well as other departments of the company.

Recognizing the fact that the geographical position of the plant prevented its employees from enjoying the benefits of association with the various local rubber groups throughout the country, the Gates Technical Club has brought Mahomet to the mountains by furnishing well-known technical men as speakers at meetings held in Denver. Occasionally, executives of the company itself have addressed these meetings.

During the past three years the following visitors have been made honorary members of the club in appreciation of talks given by them before this group: E. B. Curtis (Vanderbilt), F. S. Conover, Walter Geldard and George Vila (Naugatuck Chemical), Ira Williams and C. A. Carlton (Huber), S. M. Martin and J. W. Crosby (Thiokol), M. F. Torrence and Arthur Neal (DuPont), J. Breckley (Titanium Pigment), Andrew Hale (Farrel-Birmingham), F. H. Amon (Cabot), C. R. Haynes (Binney & Smith), and R. L. Sibley (Monsanto). Recent speakers, including Messrs. Vila, Neal and Haynes, have discussed Buna S compounding. During the summer of 1940, Dr. Ernst A. Hauser, of M.I.T., gave a special course on rubber technology sponsored by the club.

Not all of the club's programs deal with rubber chemistry. Following the policy of most of the local rubber groups associated with the Rubber Division, A.C.S., and the few independent groups, well-qualified speakers have discussed sales, advertising, research and economic problems. In the latter case, the speakers were supplied by and from the Gates management.

Present membership of the Gates Technical Club, which holds a dinner meeting monthly, totals 112 regular and associate members. Officers for the current year are Douglas Chalmers, chief chemist of the company, president; Charles O. Moore, vice-president; Arthur White, treasurer; Russell Gardner, secretary; Walter Wilson, sergeant-at-arms; and Ernest Nassimbene, president ex-officio. The founders of the club are to be heartily congratulated for their foresightedness in forming the organization and the officers for the efficient manner in which we understand the meetings are conducted.

Average Weekly Hours

American manufacturing industries worked their 15,434,000 employees an average of 44 hours per week during November, 1942, according to figures compiled by the Bureau of Labor Statistics. In the rubber industry, for the same month, 173,000 employees worked an average of 43.6 hours per week. The greatest average hours per week was recorded in the machinery field, other than electrical machinery, the average being 48.7 hours.

Harris Heads Kerite Wire

C. R. R. Harris, formerly vice-president and general manager of the Kerite Insulated Wire and Cable Co., has been elected president of that company to succeed the late Richard de Wolfe Brixey. Mr. Harris has been associated with the company for many years. He has been a member of the American Institute of Electrical Engineers for 38 years and is also a member of the Railroad Machinery Club.

LOS ANGELES RUBBER GROUP HOLDS REGULAR SUPPER MEETING

Approximately 85 members and guests attended the regular supper meeting of the Los Angeles Group, Rubber Division, A. C. S., held at the Mayflower Hotel in Los Angeles on April 6. In addition to the usual reports from officers and committee chairmen, the introduction of several visitors, and discussion of new business, which this time centered on next summer's outing, the meeting featured one speaker and the presentation of a motion picture film.

The speaker was Hugh A. Matier, who as a surveyor was employed on the Alaska Highway and who is now associated with the Union Oil Co., whose subject was "Alaska—Tomorrow's Frontier." Mr. Matier described the difficulties concerned with the construction of the highway which he termed "a major military victory" since it made possible the transportation of material to a locality essential to both offensive and defensive action. The film, presented by Frank Durbin of the Shell Chemical Co., of San Francisco, covered the manufacture of carbon black at the Shell plant.

Prizes awarded consisted of a $25 war bond which was won by Herman Libkind (Western Insulated Wire); three blocks of war stamps which went to Bob Short (Kirkhill Rubber), Galen Norton (Kirkhill Rubber), and Fred S. Ehrlich, respectively; and a brief case won by R. C. Banta (Kirkhill Rubber). The stamps were all donated by the Thiokol Corp., through Walter Boswell, local representative, while the brief case was donated by the L. H. Butcher Co. Table favors, consisting of leather cases for gasoline ration books and booklets containing hints on victory gardening, were distributed by the C. P. Hall Co., through their local representative, Bob Abbott.

Women's bicycles, designed for heavy duty service, and equipped with maple wood pedal blocks and plastic handlebar grips, are now being manufactured especially for the WAACs.

Scene at one of the recent meetings of the Gates Technical Club held in Denver, Colorado.

Who's Who in Washington—and Where

(As of April 8, 1943—Compiled by the Staff of RUBBER AGE)

OFFICE OF THE RUBBER DIRECTOR

New Municipal Building, 4th and D Sts., N.W., Washington, D. C.

Rubber Director—William Martin Jeffers.
Special Assistants—B. W. Rapp and Darrell O. Churchill.
Deputy Rubber Director—Col. Bradley Dewey.
Assistants—Morehead Patterson and Stanley Osborn.
Assistant Deputy Rubber Directors—L. D. Tompkins (Operations), Frank R. Creedon (Plant Construction), E. B. Babcock (Technology and Specifications), R. P. Dinsmore (Research and Development of Synthetics), and E. R. Gilliland (Raw Materials).
Administrative Officer—Frank P. Downey, Jr.
Head, Education Program—Dr. H. E. Simmons, assisted by J. M. Ball (Editorial), E. B. Busenberg (Reclaim), D. F. Fraser (Neoprene), C. W. Sanderson (Thiokol), A. H. Nellen (Tires and Tubes), R. F. Wolf (Butyl), Arthur Nolan (Latex and Dispersions), and W. A. Appeltoft (Statistics).
Head, Product Specifications—C. S. Reynolds, assisted by V. R. Grainger, Walter Juve (Wire and Cable, etc.), R. C. Dabney (Tape, Proofed Fabrics, etc.), R. J. Hull (Tires and Tubes, etc.), S. C. Compher (Tire Retreading), and Addis Finney (Revision of Specifications).
Head, Natural Rubber—Atherton Lee.
Manager, Priorities and Materials Control—S. P. Dorsey.
Manager, Allocations—George B. Kayser.
Manager, Requirements and Capacities—James H. Higgins.
Gen. Manager, Allocation and Production—Karl D. Fernstrom.
Supervisor, Mechanical Goods—J. E. Skane.
Research Associates—Norman A. Shephard, M. Rea Paul, A. E. Boss, D. A. Cutler, J. E. Hutchman, C. W. Perry, J. C. Elgin, W. B. Wiegand, and R. W. Kixmiller.
Assistant to Rubber Director—Kenneth Burgher.

RUBBER DEVELOPMENT CORPORATION

1626 K St., N.W., Washington, D. C.

President—Douglas H. Allen.
Assistants—R. B. Bogardus and James C. Roberts.
Vice-Presidents—John W. Bicknell, Reed Chambers, Paul McKee and William E. Mitchell.
Head Field Technician—C. B. Manifold.
Associates—Earl M. Blair and W. A. Stanton.
Rubber Analyst—Preston W. Barker.
Distribution Specialist—Richard Cooke.
Chief of Procurement—E. B. Murphy.
Chief Procurement Analyst—A. J. Lockwood.
Rubber Specialist—L. B. Proctor.
Administrative Assistants—Curtis E. Anderson, John H. Brunner, B. B. Carlin, D. C. Carnes, Harry Carragher, H. J. Corson, Phillip Druiding, John D. Farnham, William V. Garrett, Everett G. Holt, Robert Hutchins, H. R. Merritt, E. G. Mills, E. B. Murphy, J. J. Pesaric, Harry Shere, G. W. Sniffin, Robert G. Walker, and R. S. Walter.
Commercial Research—E. G. Holt.
Senior Research Analyst—J. F. Dunbar, Jr.
Assistant Production Specialists—Richard S. Smith and G. R. Ward.

Note: The Traffic and Purchasing Departments are in the H.O.L.C. Building, 1st and Indiana Ave., N.W., Washington, D. C.

RUBBER RESERVE COMPANY

811 Vermont Ave., N.W., Washington, D. C.

Chairman of the Board—Jesse H. Jones.
President—Howard J. Klossner.
Special Assistant—China R. Clarke.
Vice-Presidents—R. D. Young, Henry A. Mulligan and Stanley T. Crossland.
Secretary—George H. Hubert.
Treasurer—W. C. Beck, Jr.
General Counsel—H. Clay Johnson.
Chairman, Buying Committee—A. L. Viles.
Vice-Chairman, Buying Committee—A. D. Moss.

OFFICE OF PRICE ADMINISTRATION

Third and Independence Ave., N.W., Washington, D. C.

Rubber Price Branch

Price Executive—Temporarily vacant.
Chief Counsel—John N. Cole.
Head, Raw Materials Section—Orson H. Hart.
Head, Tire Price Section—Robert V. Mitchell.
Head, Other Rubber Products Section—Everett D. Hawkins.
Head, Industry Analysis Section—George W. Bolton.
Head, Special Projects Section—Kenneth E. Lawton.
Administrative Officer—Arthur F. Schalk, Jr.

Automotive Supply Rationing Division

Director—Charles F. Phillips.
Legal Counsel—David L. Lloyd.
Head, Field Section—H. C. Butkiewicz.
Administrative Officer—John B. Annett.
Chief, Tire Rationing Branch—Robert S. Betten.
Heads, Tire Rationing Branch—R. G. Leeth (Eligibility Section), A. Koehler (Tire Industry Section), A. G. Richtmyer (Research Section), L. A. Brown (Tire Inspection Section), and R. E. Sewell (Quota Section).

GUAYULE EMERGENCY RUBBER PROJECT

Director—Evan W. Kelley.
Associate—Paul H. Roberts.
Assistant—E. L. Perry.
Chief, Division of Administration and Management—L. C. Stockdale.
Chief, Personnel Management—J. R. Nelson.
Chief, Division of Crop Production—L. S. Gross.
Chief, Division of Lands—G. F. Fine.
Chief, Surveys and Investigation—Dr. W. G. McGinnies.
Chief of Engineering—James J. Byrne.
Chemical Engineer—George W. Miller.
Head, Equipment Maintenance—George L. Bouck.
Principal Plant Physiologist—Dr. W. B. McCallum.
Head, Pilot Mill—D. S. Olson.
Head, Soil Surveys—John L. Retzer.
Director of Research—Dr. A. C. Hildreth.
Physiologist—Dr. Hamilton P. Traub.
Geneticist—Dr. Leroy Powers.
Pathologist—Dr. Wm. A. Campbell.
Agronomist—Delmar C. Pingey.
Rubber Technologist—Raiford L. Holmes.

Note: The Guayule Emergency Rubber Project, Forest Service, Department of Agriculture, maintains headquarters in Salinas, California. Most of the personnel listed above are members of the Forest Service, while others are officially members of the Bureau of Plant Industry.

NAMES IN THE NEWS

L. B. McCOURT, sales manager of the Corduroy Rubber Co., Grand Rapids, Mich., for the past fourteen years, was recently elected secretary of the company to succeed the late B. T. SCHALL. He will continue to act as sales manager.

HERBERT E. SMITH, president of the U. S. Rubber Co., has been elected a trustee of the Consolidated Edison Co. of New York, Inc. He is also a trustee of the Brooklyn Trust Co.

ROGER B. GRIFFIN, son of Roger B. Griffin, who with Arthur D. Little founded the consulting firm of Arthur D. Little, Inc., Cambridge, Mass., has been elected a vice-president of that firm. HENRY G. POWNING succeeds him as treasurer.

SMITH JOHNSON, president of the Johnson Rubber Co., Middlefield, Ohio, who has been acting as assistant manager of priorities for the Office of the Rubber Director, has been appointed chief of the Steel Drums, Cylinders and Tight Cooperage Section, Containers Division, WPB.

A. E. POWELL, who left his position as research chemist at the Morristown, N. J., plant of the Flintkote Co. a few months ago to join the Rubber Reserve Co., has returned to Flintkote.

DAVID H. FORBES, well known rubber technologist, who has been associated with the Servicised Products Corp., Chicago, for the past two years, has joined the O'Sullivan Rubber Co., Inc., at Winchester, Va.

JACK FURBEE, associated with the Marietta Dyestuffs Co. for the past eleven years has joined the Firestone Tire & Rubber Co. where he is receiving special training in synthetic rubber production preparatory to his assuming the post of production supervisor at the copolymer plant to be operated in Texas by General Tire in conjunction with the General Latex & Chemical Co.

GEORGE R. ATKINS, who has been with the Bristol Co., Waterbury, Conn., since 1929, has been named manager of the company's branch sales office and factory in Akron.

E. H. BROWN has been named sales manager of the Bauer & Black Division of the Kendall Co., Chicago, succeeding H. B. CROW, a vice-president of the company, who has been named merchandising executive in charge of drug and surgical dressings.

ARTHUR B. NEWHALL, former Rubber Coordinator, has been appointed executive director of the Combined Production and Resources Board of WPB. He will supervise and control the work of the Board's combined staff and will exercise general direction over the work of the various committees set up from time to time to make special studies and reports. MR. NEWHALL was associated with Goodrich and Hood Rubber for many years.

FRED CLIMER, assistant to the president of the Goodyear Tire & Rubber Co., Akron, was appointed industry representative on the regional war labor board having jurisdiction in Ohio, Kentucky and West Virginia on April 3. He succeeds T. G. GRAHAM, vice-president of the B. F. Goodrich Co., who resigned because of the press of business.

C. JAMES DUNNE, president and treasurer of the Dunne Rubber Co., Ashtabula, Ohio, addressed the Ashtabula Kiwanian Club on March 16. He reviewed the present rubber situation.

EMMETT SHEAHAN, assistant to the president of the U. S. Rubber Co., was recently named a member of the Manpower Utilization Committee of the Automotive Council for War Production.

ROY M. SMITH, who joined the Roller-Smith Co., Bethlehem, Penna., as assistant chief engineer in August, 1942, has been appointed chief engineer, succeeding J. D. WOOD, resigned.

T. SPENCER SHORE, vice-president and treasurer of the General Tire & Rubber Co., Akron, was elected a director of the Eagle-Picher Lead Co., Cincinnati, on March 23. The latter company is currently celebrating its 100th anniversary.

CHARLES BELKNAP, executive vice-president of the Monsanto Chemical Co., was elected president of that company last month, succeeding EDGAR MONSANTO QUEENY, who was elected chairman of the board.

JOHN L. COLLYER, president of the B. F. Goodrich Co., has been named a member of the governing board of the National Industrial Information Committee. ALFRED P. SLOAN, JR., chairman of the General Motors Corp., is chairman of the special committee.

RUSSELL A. FIRESTONE, who has been acting as general manager of the Nebraska Defense Corp., a subsidiary of the Firestone Tire & Rubber Co. which operates a bomb loading plant near Omaha, has been elected assistant treasurer of the parent company and has returned to Akron.

Charles L. Glaes

CHARLES L. GLAES, who started as a clerk in the Williamsport, Penna., plant of the U. S. Rubber Co., 26 years ago, has been appointed production manager of the company's four footwear plants. Prior to his new appointment, he was factory manager of the Mishawaka, Ind., plant.

KENNETH BURGHER, public relations counsel of Miami, Florida, has been designated as press officer for the Office of the Rubber Director. In recent months he has been serving with the Office of Civilian Supply.

T. F. "TOMMY" CALLAHAN, associated with the sales staff of Wishnick-Tumpeer, Inc., for the past seven years, has been commissioned as a lieutenant (j.g.) in the U. S. Naval Reserve.

J. K. WEIDIG, who has been assistant general manager in charge of coated fabrics of the Atlas Powder Co., has been appointed general manager of the cellulose products department of that company, which includes the Zapon and Zapon-Keratol divisions. He will be located at the Stamford, Conn., plant. E. H. BUCY, who resigned as chief of the Protective Coatings Section of WPB to join the company, has been named assistant general manager of the cellulose products department.

KEITH POWLISON, formerly treasurer of the Armstrong Cork Co., Lancaster, Penna., was elected vice-president and controller of that company last month, succeeding GEORGE M. ARISTMAN, resigned. M. J. WARNOCK, formerly director of advertising and promotion, has been elected treasurer.

Have you ordered space yet in the 1943 RUBBER RED BOOK?

FINANCIAL NEWS

Dayton Rubber Gets Financing

The Dayton Rubber Manufacturing Co., Dayton, Ohio, has completed arrangements for $2,500,000 of new financing, the Equitable Life Assurance Society purchasing $2,050,000 of 15-year debentures and the First National Bank of Chicago advancing $450,000 on one to three-year serial notes. Proceeds from the new financing were applied to the payment of $1,250,000 of bank loans due serially to October, 1948, and the balance added to the company's working capital for general corporate purposes. The new debentures carry an interest rate of 4% per annum and are due March 1, 1958. A sinking fund of $150,000 annually begins March 1, 1947. Repayment of the new serial notes was scheduled at the rate of $150,000 annually beginning March 1, 1944.

Mansfield Tire & Rubber Co.

For 1942: net income of $507,257, after provision of $475,000 for Federal income and excess profits taxes, equal to $3.02 a share, which compares with $484,475, or $2.88 a share, in the preceding year. Gross sales in 1942 amounted to $12,004,636, and net sales to $11,335,865. Net profit from operations amounted to $1,199,623. The balance sheet as of December 31, 1942, showed current assets of $4,060,979, including $694,018 in cash, $1,203,182 in accounts receivable, and $2,163,779 in inventories, against current liabilities of $2,036,881, including $750,000 in notes payable. $7,765 preferred dividends payable January 2, 1943, $475,000 in accrued taxes, and $804,116 in accounts payable. Total assets were shown at $6,735,753.

Intercontinental Rubber Co.

For 1942: Net profit of $565,781, which compares with $370,233 in the preceding year. The rubber plantation maintained by the company in Sumatra, now in Japanese possession, has been completely written off. The report reveals that production of guayule rubber in Mexico amounted to 5,764,400 pounds in 1939; 10,121,200 pounds in 1941; and 12,663,800 pounds in 1942. The company sold its guayule holdings in California to the Government during the year.

Joseph Dixon Crucible Co.

For 1942: Net income of $236,692, after Federal income and excess profits taxes, equal to $4.73 a share, which compares with $451,545, or $9.03 a share, in the previous year.

Columbian Carbon Company

For 1942: Net income of $3,132,659, after all charges and taxes, equal to $5.83 a share, which compares with $3,529,159, or $6.57 a share, in 1941. According to a statement accompanying the report, sales of channel black declined 45.3% in volume and 40.5% in dollars. The statement also revealed that the company has one furnace-type black factory in operation at Hancock, La., another is expected to start operations shortly at Fairbanks, Texas, a third is nearing completion at Eola, La., and a fourth is planned to be in service before the end of the year at Conroe, Texas. The four plants will have a combined capacity of from 65,000,000 to 85,000,000 pounds annually, depending upon the types manufactured.

Corduroy Rubber Company

For 1942: Net income of $95,499, equal to 63c a share on 28,108 shares of common stock, which compares with $219,341, or $3.53 a share on 28,110 shares, in the preceding year. Net income for 1942 before provision of $50,000 for taxes amounted to $145,498. Sales during the year totalled $1,463,911, before allowance of $84,785 for discounts. The balance sheet as of December 31, 1942, showed total current assets of $973,762 against total current liabilities of $121,703. Total assets were shown at $1,525,402.

General Cable Corporation

For 1942: Net profit of $2,786,171, after estimated Federal income and excess profits taxes of $11,500,000, against which immediate debit retirement credit of $323,000 was available and further credit of $750,000 will be available after the war. In addition, general reserve of $650,000 for inventories was set aside from earnings and the balance of $2,136,171 was transferred to surplus. Last year, the company reported a net profit of $3,937,921, after taxes of $8,760,000.

American Wringer Company

For 1942: Net income of $105,387, equal to 95c a share on 110,835 shares of common stock, which compares with $380,512, or $3.43 a share, reported in the previous year.

Garlock Packing Company

For 1942: Net income of $1,106,356, equal to $5.28 each on 209,250 common shares, which compares with $1,434,858, or $6.36 a share, in 1941. Taxes amounted to $3,083,806 and $2,209,965, respectively.

New Report on Softeners

The effect of some of the most commonly used softeners on the physical properties of Buna S is outlined in a report just issued by Wishnick-Tumpeer Inc., 295 Madison Ave., New York City. The report summarizes the results of tests conducted at the company's laboratories. The tests were performed on Buna S formulations incorporating 5, 10, and 15 parts of three types of softeners: asphaltic, coal tar, and natural tar. Data were obtained for all of these formulations on the following properties: plasticizing action, hardness, modulus, tensile strength before and after aging, resilience, elongation, tear resistance, and abrasion resistance. Results of the tests are summarized in both tabular and graphic form in the report.

Girdle Company Is Penalized

The Real Form Girdle Co., Brooklyn, N. Y., has been penalized under Suspension Order S-258 for violating the provisions of Conservation Order M-124. The manufacturer knitted more than 1,000 pounds of rubber yarn into elastic fabrics for women's girdles after the issuance of the conservation order last August, prohibiting the use of rubber yarn to make girdles. The suspension order withholds priorities assistance and allocations of scarce materials from the company from March 24 to June 24.

Glyco Products Co. Moves

Glyco Products Co., Inc., of Brooklyn, N. Y., are moving their administrative offices to larger quarters. On or about April 15th they will be located at 26 Court Street in Brooklyn. The telephone number remains as MAin 4-1760. The move is being made in line with the company's expansion program.

National Rubber Machinery Co.

For 1942: Net profit of $407,562, after provision of $175,000 for post-war adjustments and contingencies and $1,309,291 for Federal and excess profits taxes, equal to $2.64 a share, which compares with $374,752, or $2.43 a share, in 1941. Net sales amounted to $6,159,745 and $3,192,973, respectively.

Lima Cord Sole & Heel Corp.

For 1942: Net income of $86,917, equal to 79c a share on 110,659 shares of common stock, which compares with $130,065, or $1.16 a share on 111,689 shares in 1941.

Kleinert Rubber Company

For 1942: Net profit of $315,817, equal to $1.94 a share, which compares with $411,043, or $2.52 a share reported in the previous year.

LOS ANGELES NEWS

George Steinbach, assistant to Ed Royal, of H. M. Royal, Inc., attended the national convention of the American Chemical Society at Detroit. He also visited the home factory in Trenton, New Jersey, during his absence from Los Angeles.

E. D. Caram, proprietor of the Caram Manufacturing Company, reports that he is now partly retired, that business is especially good, and that the demand is greater than the supply for his products. He manufactures rubber soles and heels and specializes on rubber cement.

E. Brazil, representative of Blue Star Mines, Ltd., has been honorably discharged from war service. For thirteen weeks he has been at Camp Sibert, Alabama, in the Chemical Warfare Department. He is resuming his old duties in the Los Angeles area.

A San Francisco office has been opened in Room 557, Russ Building, by Reinke, Hiller & Amende, Inc. Herbert Munger is in charge. Mr. Munger comes from Washington, D. C., where for some time he was connected with the OPA.

E. G. Brooks, proprietor of Hollywood Golf Products, has returned from a trip to various parts of Mexico and Pensacola, Florida. In the latter place he visited his son who is in the service. Mr. Brooks reports that the demand for re-built golf balls is tremendous.

Karl F. Dunkel is celebrating the first anniversary of his return from Australia where for two years he was employed by Frank Beaurepaire. Mr. Dunkel reports that Mr. Beaurepaire is now Sir Frank Beaurepaire. Knighthood was bestowed upon him at the conclusion of his third term as Lord Mayor of Melbourne. Mr. Dunkel is now chief chemist for the Sierra Rubber Company.

Fred S. Ehrlich, proprietor of Fred S. Ehrlich and Company, has returned from a trip to Lower California where he made large purchases of chile peppers as a side issue. Mr. Ehrlich is well known in the rubber industry in Los Angeles.

Bert Biheller, Los Angeles manager for H. Muehlstein and Company, Inc., has added quite largely to his office staff recently due to the press of detail office work occasioned by war conditions.

Charlie Lamb reports that business is exceedingly brisk at the plant of West American Rubber Company. New equipment is being added when, as, and if obtained. The products of this company are going largely into war equipment.

Standard Rubber, Inc., has started work in its new building located at Gage and Compton Boulevards. However, all equipment will not be placed for some little time to come. The home location on Slauson Avenue is being retained.

Charles Lamb, Jr., reports that work will soon be begun in the new plant of the Technical Rubber Company. This is a new firm recently organized. A three and one-half acre site has been purchased in Alhambra and buildings are now being erected. The first building will be 80 by 160 feet in dimensions. The company will manufacture a general line of synthetic rubber products.

Clinton R. Bigelow, chief chemist for the Darnell Corporation, Long Beach, announces that he will be married on June first to Miss Dottie Childs, of New Haven, Connecticut. He will go to New Haven for the ceremony.

Monty Montgomery recently made a trip to Wyandotte, Michigan, to attend ceremonies in connection with the awarding of the Army and Navy "E" Certificate to Sharples Chemicals, Inc., a firm represented in Los Angeles by Martin-Hoyt and Milne, Inc. Mr. Montgomery is the manager of the Los Angeles branch of this latter firm.

L. A. Donovan is moving his experimental plant from Haynes to a new location in the Alhambra vicinity. Dr. Donovan has been working on a synthetic rubber formula for the past eighteen months.

A disastrous fire swept the plant of the Santa Fe Rubber Mills on March 28. In addition to the destruction of the plant several tons of rubber were also destroyed. While the company expects to rebuild and replace lost equipment a date for resumption of such activities can not yet be given. The fire is assumed to be of accidental origin. It is not thought to be the result of sabotage.

Bill Haney, plant manager for the Kirkhill Rubber Company, was among those who went to Detroit to attend the national convention of the American Chemical Society. Mr. Haney is quite recovered from his recent injury and is traveling without his crutches.

The addition to the plant of the W. J. Voit Rubber Corporation is nearing completion. This greatly increases the capacity of the plant now specializing somewhat on leak-proof gasoline tanks.

The 1943 RUBBER RED BOOK closes soon—Send in your Advertising Order today!

Install Giant Vulcanizer

One of the largest vulcanizers ever manufactured for the industry, designed for use in the production of pontoons for the armed forces, has been installed in

one of the Akron plants of the B. F. Goodrich Co. Weighing 33 tons, the huge vulcanizer is 42 feet long and 10 feet, 6 inches, in diameter. It was necessary to move the vulcanizer up the side of a three-story building and across a roof to place it in position, factory entrances being much too small. The giant vulcanizer was constructed by the Miami Boiler & Machine Co., of Akron.

Complete Factory in Cuba

The completion of a new $1,000,000 factory in Cuba was announced on March 19 by the B. F. Goodrich Co. Built in Puentes Grandes (Big Bridge), a suburb of Havana, the plant was begun in 1940, nearly two years before the United States entered the war, but was halted temporarily by the war. The factory will be operated under the name of Compania Gomera Goodrich Cubana, S. A. (Goodrich Rubber Co. of Cuba). It will produce only truck and bus tires and tubes and repair materials, including camelback, for the present, but expansion into other lines is visualized for the future. The new company, which is headed by Russell F. Moody as vice-president and general manager, has 200 employees at present, including office and sales help. C. W. Beaman is factory superintendent and D. G. Benson, technical superintendent.

Additional "E" Awards Made

Including among companies awarded the Army-Navy "E" for production efficiency in recent weeks were the following:

B. F. Goodrich Co., Clarksville Division, Clarksville, Tenn.

National Rubber Machinery Co., Clifton, N. J.

Seiberling Rubber Co., Barberton, Ohio.

CANADIAN NEWS

F. A. Grant, for many years divisional manager for the Dunlop Tire and Rubber Goods Company, Ltd., in the Maritimes, has been placed in charge of the newly organized Eastern Division of Dunlop. Mr. Grant's headquarters will be in Montreal.

Col. Paul R. Hanson, former manager of the Quebec division, is retiring after 33 years of service with the company. Col. Hanson served overseas in the last war and is a holder of the O.B.E.

In addition to his duties as Director of Development for the Dominion Rubber Company, Ltd., M. F. Anderson has been made general manager of Naugatuck Chemicals, Ltd., Elmira, Ontario, and of the Rubber Regenerating Division of Dominion, at Montreal. The latter two organizations have resulted from the division of the former Chemical and Regenerating Division. Mr. Anderson will continue his headquarters in Montreal.

Two representatives of the Polymer Corporation are learning the intricacies of processing the general purpose synthetic rubbers these days in order that they will be able later to counsel Canadian rubber companies on problems arising in connection with use of these materials.

They are Harry Cox, on leave from his duties as production manager of the mechanical goods division, B. F. Goodrich Rubber Co., Ltd., Kitchener, and Joseph W. Holmes, Jr., formerly with C.I.L. and more recently executive assistant to J. R. Nicholson, Polymer Corporation general manager. Mr. Cox has been studying the utilization of Buna S rubber while Mr. Holmes has been working at the rubber laboratory of the Standard Oil Development Company, in Elizabeth, New Jersey, where he has been learning about the properties and uses of butyl rubber. Both of these synthetics will be manufactured in the Dominion government-owned plant nearing completion at Sarnia, Ontario.

All orders affecting the processing of natural, synthetic, and reclaim rubber have been consolidated into a single new rubber control order, it was announced on March 27 by the Department of Munitions and Supply. The new order, issued by Rubber Controller Alan H. Williamson, lists those articles for which no rubber has been released since early in 1942. It also lists rubber items which may still be manufactured in accordance with rubber control specifications, and those which may be made only from reclaim.

No passenger tires are manufactured other than a limited few now being made from reclaim. Usable tires, tubes and retreading service are rationed, with 120 rationing representatives throughout Canada handling the machinery of equitable distribution to essential users.

Only the most essential civilian rubber articles, like truck and bus tires, surgeons' gloves, belting and industrial hose may be manufactured, under rigid specification.

Rubber reclaimed from scrap is under the same control and is being used to as large an extent as possible for making essential war supplies. Some reclaim is being released for civilian use but only for a restricted list of items, including a limited quantity of staple black lines of waterproof footwear.

Erie Accelerator

Erie Accelerator, a liquid mixture of aliphatic thiazole disulfides, especially developed for use with synthetic rubbers, has been introduced by the Philadelphia Rubber Works Co., Akron Co., Akron, Ohio. The new accelerator is said to have shown particular merit in low hysteresis GR-S compounding for heavy duty tires. It is brown in color, has a mild, characteristic, not unpleasant odor, a molecular weight of 288, and a specific gravity of 1.31. Erie Accelerator is insoluble in water and soluble in benzene, gasoline, and most organic solvents. It is soluble in rubber. A useful masterbatch consists of GR-S 60%, Erie Accelerator 20%, zinc oxide 20%.

Firestone Purchases New Mill

Purchase of the Worth Textile Mills in Fort Worth, Texas, for the manufacture of cord fabric for tires was recently announced by the Firestone Tire & Rubber Co. Detailed plans for the operation of the mills, of which John P. King was president, are expected to be announced shortly.

OBITUARIES

Edward L. Shaw

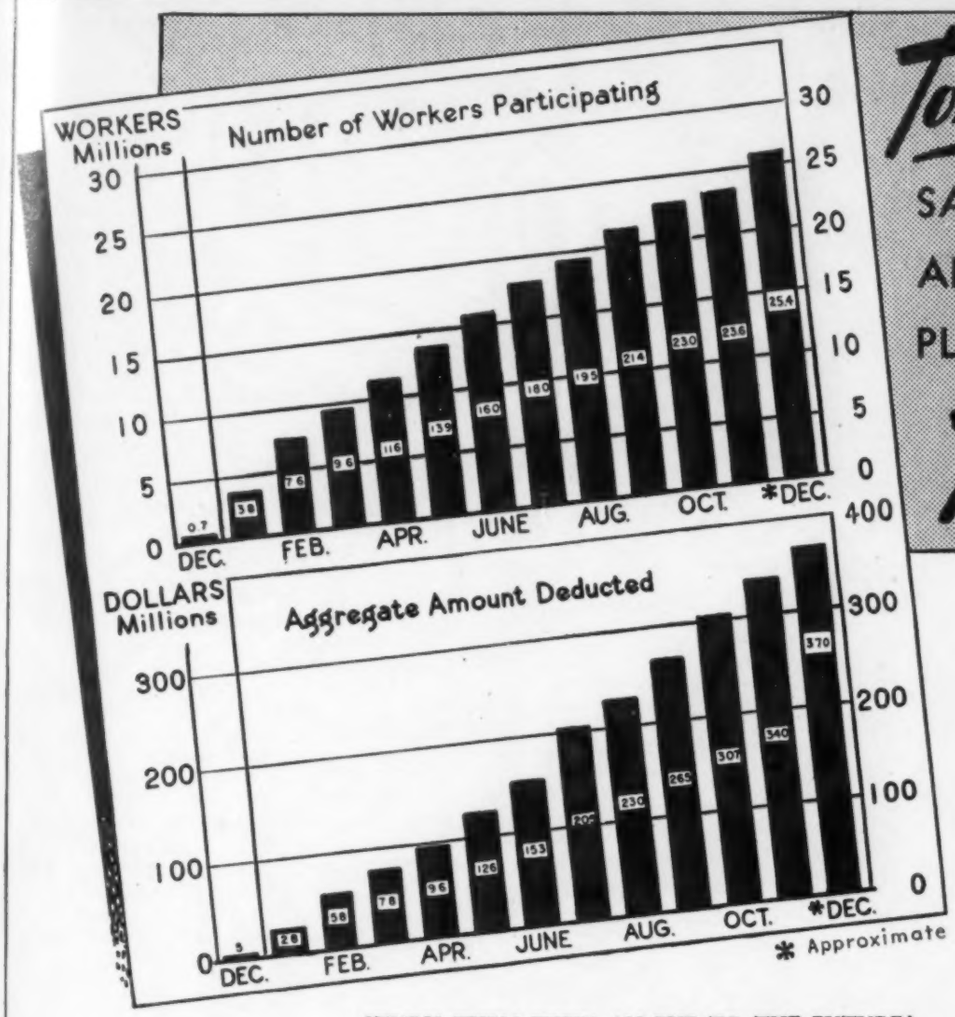
Edward Lyman Shaw, chairman of the board and president of the United Elastic Corp., Easthampton, Mass., of which the Easthampton Rubber Thread Co. is a unit, died in Florida on February 6 while on a vacation trip. Death was attributed to a heart ailment. He was 67 years of age. Mr. Shaw was born in Easthampton on August 12, 1875. He attended Williston Academy and then studied law, being admitted to the bar in 1897. He then practiced law for several years and from 1919 to 1921 served as a Justice of the Superior Court of Massachusetts, resigning to become vice-president of the First National Bank of Northampton. In 1923 he was elected a director of the Easthampton Rubber Thread Co., becoming a vice-president in 1926 and president in 1934, holding the latter post until his death. In 1927 the United Elastic Corp. was formed as the result of a merger of four thread concerns, including Easthampton Rubber Thread, with Mr. Shaw as director, president and chairman of the board. A widow and son survive.

Arthur Reeve

Arthur Reeve, for many years manager of the footwear department of the United States Rubber Co., and who retired last January as traveling merchandise auditor for the company, died in Los Angeles, Calif., last month. Mr. Reeves was with U. S. Rubber for 60 years, starting at the Providence, R. I., plant in 1887. In 1911 he was sent to Europe to adjust some of the company's foreign claims and in 1912 became manager of the footwear department. In 1915 he was made manager of the export footwear department and two years later supervisor of production at all footwear plants. In 1922 Mr. Reeves was appointed to investigate the merchandising methods of the company and from then until his retirement he was merchandise auditor of factories and branch offices. A widow and three daughters survive.

Frank C. Ball

Frank Clayton Ball, president of the Ball Brothers Company, the largest manufacturers of glass preserving jars in America and a large producer of rubber jar rings, died at his home in Muncie, Indiana, on March 19 at the age of 85. Mr. Ball was born in Greensburg, Ohio, in 1857. His first business venture was in partnership with his brother, Edmund, in the manufacture of fish kits. Later, three additional brothers were taken into the firm and the company expanded rapidly, its annual business reaching an estimated $10,000,000. Mr. Ball was widely known for his philanthropic work.



Tomorrow's SALES CURVES ARE BEING PLOTTED . . . Today

THESE CHARTS SHOW ESTIMATED PARTICIPATION IN PAYROLL SAVINGS PLANS FOR WAR SAVINGS BONDS *(Members of Armed Forces Included Starting August 1942)*

STUDY THEM WITH AN EYE TO THE FUTURE!

There is more to these charts than meets the eye. Not seen, but clearly projected into the future, is the sales curve of tomorrow. Here is the thrilling story of over 25,000,000 American workers who are today voluntarily saving close to FOUR AND A HALF BILLION DOLLARS per year in War Bonds through the Payroll Savings Plan.

Think what this money will buy in the way of guns and tanks and planes for Victory today—*and mountains of brand new consumer goods tomorrow.* Remember, too, that War Bond money grows in value every year it is saved, until at maturity it returns $4 for every $3 invested!

Here indeed is a solid foundation for the peace-time business that will follow victory. At the same time, it is a real tribute to the voluntary American way of meeting emergencies that has seen us through every crisis in our history.

But there is still more to be done. As our armed forces continue to press the attack in all quarters of the globe, as war costs mount, so must the record of our savings keep pace.

Clearly, on charts like these, tomorrow's Victory —*and tomorrow's sales curves*—are being plotted today by 50,000,000 Americans who now hold WAR BONDS.

EVERYBODY EVERY PAYDAY AT LEAST 10%

Save with

War Savings Bonds

This space is a contribution to America's all-out war effort by

RUBBER AGE

New Rules and Regulations on the Distribution of Rubber

(Circular No. 17 of the Rubber Reserve Company)

GENERAL

1. This Circular supersedes all previous Circulars issued by Rubber Reserve Company relating to the sale of crude rubber, balata, guayule, synthetic rubber and liquid latex.

2. Effective April 1, 1943, crude rubber, balata, guayule, synthetic rubber and liquid latex will be sold for civilian use and for other than civilian use at the prices listed in the respective columns on the attached schedule designated Exhibit "A", which has been approved by the Office of Price Administration and the Office of the Rubber Director. The uniform freight charges hereinafter referred to will be added to such prices. In accordance with the provisions of the telegram of March 8, 1943, from L. D. Tompkins, Assistant Deputy Rubber Director in Charge of Operations, manufacturers will, however, be permitted to purchase, at the prices which were in existence prior to April 1, 1943, an amount of rubber sufficient to build up a sixty day working inventory as of March 31, 1943, for consumption for all permitted purposes, provided requests therefore are received by the Office of the Rubber Director prior to April 1, 1943. Upon receipt of the approval of the request from the Office of the Rubber Director, Rubber Reserve Company will issue the necessary purchase permit, although in most instances the actual delivery of the material will not be effected until after April 1, 1943. Subject to the aforesaid sixty day inventory limitation, rubber covered by outstanding purchase permits which specify delivery prior to the month of April will be sold at the prices in existence prior to April 1, 1943, provided such purchase permits are presented to the Distributing Agent of Rubber Reserve Company within thirty days from the date of the issuance thereof.

3. In view of the uncertainty of the location of warehouses and producing plants from which crude rubber, balata, guayule, synthetic rubber and liquid latex will be delivered, and in order to establish a uniform freight charge to all manufacturers, a charge of 50c per 100 pounds net weight on the material shipped in carload lots (at the minimum quantity weight for the applicable freight rate) and $1.00 per 100 pounds net weight on the material shipped in less than carload lots will be added by Rubber Reserve Company to the selling prices appearing on Exhibit "A". In connection with liquid latex, freight charges will be based on the total dry latex solids weight. The certified check or banker's New York draft which is delivered to the Agent of Rubber Reserve Company by the manufacturer, or its dealer agent, in payment of the material should include the amount of the uniform freight charge referred to above. Freight will be paid by Rubber Reserve Company to the purchaser's railroad siding at first destination or point of railroad delivery at first destination in continental United States. The purchaser should route the material purchased in such manner as to protect storage in transit privileges, and the applicable through rate from first point of origin or port of entry to designated destination, if storage in transit arrangements have previously been made by Rubber Reserve Company.

In the event the purchaser elects to use a method of transportation other than rail, Rubber Reserve Company will pay the established charges for the actual method of transportation used to the extent they do not exceed the amount Rubber Reserve Company would have paid had the purchaser made shipment by rail.

A straight rail bill of lading should be prepared by the purchaser or its dealer agent in the name of Rubber Reserve Company, as shipper, and endorsed "To Be Prepaid" in the column provided for on the bill of lading.

The original or memorandum signed bill of lading and prepaid freight bill, in triplicate, should be forwarded by the purchaser or its dealer agent to the Agent of Rubber Reserve Company which released the material for shipment in order that payment may be made to the carrier.

After title passes in accordance with the provisions of paragraphs 11, 12, 18, 23, 25, 30 and 36 hereof, Rubber Reserve Company accepts no responsibility for any loss whatsoever, including, without limitation, shortages, deterioration, damage, insurance coverage or failure of the purchaser or its dealer agent to comply with the provisions of this Circular.

4. Deliveries of crude rubber, balata, guayule, synthetic rubber and liquid latex will be made in the manner hereinafter provided. In order that there may be the least possible dislocation in the usual channels of distribution, it is assumed that most manufacturers will prefer to have dealers act as their agents in purchasing crude rubber, balata, guayule and synthetic rubber from Rubber Reserve Company, and in connection therewith render certain services as has been the custom in the past. This procedure, however, is optional and should they so desire, manufacturers may arrange for their own deliveries.

The Rubber Trade Association of New York, Inc., has prepared the following schedules of fixed charges (exclusive of charges for weighing which will be absorbed by Rubber Reserve Company) to be made by dealers when acting as agents for manufacturers:

Long Tons	Schedule No. 1 Plantation, Synthetic, Guayule and Wild Rubbers per lb.	Schedule No. 2 Balata per lb.
750 tons and over.....	⅛c	½c
100 tons up to 750 tons...	¼c	½c
30 tons up to 100 tons....	⅜c	½c
10 tons up to 30 tons.....	¾c	1¼c
1 ton up to 10 tons.....	1c	2c
Less than 1 ton.....	2½c	4c

The charges contained in Schedule No. 1 (which are for the account of the manufacturer and not Rubber Reserve Company) shall apply to the entire weight of all grades of crude rubber, guayule and synthetic rubber which any manufacturer may be authorized to consume during a single month, irrespective of the number of individual deliveries made or the number of dealers involved. Similarly, the charges contained in Schedule No. 2 shall apply to all grades of balata.

These charges are predicated on maximum terms of payment of 30 days, beginning on the day the dealer pays Rubber Reserve Company for the crude rubber, balata, guayule or synthetic rubber.

The Rubber Trade Association of New York, Inc., has advised that it will set up an organization to consolidate, whenever possible, less than carload lots and this service should result in considerable saving to purchasers of small parcels, and should ease transportation facilities and expedite arrival of the rubber at consumer's plants.

5. All requests by manufacturers for the issuance of permits authorizing the purchase of crude rubber, balata, guayule and liquid latex should be addressed to the Office of the Rubber Director, War Production Board, New Municipal Building, Washington, D. C., and should be mailed in sufficient time to reach such office prior to the fifteenth day of the month preceding the month during which delivery is desired. There is attached hereto a sample form, designated Exhibit "B", which is to be used for this purpose. Attention is called to the fact that a separate space is provided on the form for the filing of requests for crude rubber, liquid latex and balata to be used in the manufacture of permitted civilian items. This form should be executed in quadruplicate. (It will be necessary for the manufacturer to draft its own forms, since a supply thereof is not available for distribution.) In cases where a manufacturer requests purchase permits for the purchase of liquid latex, the detailed information appearing on the attached form, designated Exhibit "C," should be supplied in connection with each lot requested. (EDITOR'S NOTE: Forms designated as Exhibit "B" and Exhibit "C" are not reproduced. Samples of these forms may be secured on request from the Office of the Rubber Director.)

6. All requests for allocations of synthetic rubber should be addressed to the Synthetic Rubber Allocation Section, Office of the Rubber Director, War Production Board, New Municipal Building, Washington, D. C., as has been the custom heretofore.

CRUDE RUBBER

7. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of crude rubber, purchase permits will be issued by Rubber Reserve Company, in triplicate, and mailed to the manufacturer. Although no change is being made in the form of purchase permit currently in use, separate purchase permits will be issued in connection with rubber to be consumed in the manufacture of permitted civilian items. While the purchase permit specifies that payment is to be made by certified check, banker's New York drafts are acceptable. It is possible that in some cases the request will not be approved as submitted, and in these instances, the amount of crude rubber specified in the purchase permit will represent the action of the Rubber Director. Owing to the necessity of balancing and conserving the stockpile and the uncertainty as to the types and grades which will be available, purchase permits will reflect only the total amount of rubber authorized by the Office of the Rubber Director, and the selling price will not be specified thereon. Either the word "CIVILIAN" or "NON-CIVILIAN" will be typed on all purchase permits issued on and after April 1, 1943, to designate the price which is applicable. In order to facilitate distribution, purchase permits will be issued, in so far as is practicable, in quantities of 100 tons. All purchase permits must be delivered to the Distributing Agent of Rubber Reserve Company within thirty days from the date of the issuance thereof or returned to the Sales Department, Rubber Reserve Company, 811 Vermont Avenue, N. W., Washington, D. C., for cancellation.

8. Full consideration will be given to each manufacturer's request for specific types and grades of rubber, but no assurance can be given that the type and grades requested will be available for delivery.

9. Rubber Reserve Company will sell rubber to manufacturers ex dock or ex warehouse, at the option of Rubber Reserve Company, at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

10. All sales of crude rubber will be handled by D. D. Haldane, Distributing Agent, Rubber Reserve Company, 15 William Street, New York, New York. Purchase permits must be executed in triplicate and delivered to the Distributing Agent at the time the rubber is received. The triplicate copy, which will represent an invoice, will be returned to the manufacturer for its files.

11. Crude rubber will be sold on a 10% examination and net test weight basis or on 100% gross weighing and 10% or 100% taring basis, depending upon the grade, at the option of the Distributing Agent, and payment therefore will be required at the time of delivery, by certified check or banker's New York draft, payable to Rubber Reserve Company. It will, therefore, be necessary for manufacturers or their dealer agents to weigh and inspect at point of delivery, thus eliminating the necessity for any adjustments after delivery. Rubber Reserve Company will absorb the cost of the weighing in all cases, but if delivery is made ex warehouse, the charge for reweighing shall not exceed 65c per package net tested on all Plantation Rubber tendered where resident approved weighers have established offices, or 80c per package net tested on all Plantation Rubber tendered where no approved weighers have established offices with the exception of all rubber tendered in the State of California where Rubber Reserve Company, for the present, pursuant to the existing laws of such state, is paying $1.25 per package tested. Weighing of grades other than Plantation Rubber will be paid for at current rates subject to the approval of the Distributing Agent.

Weighing charges other than those specified above will be paid for at current rates subject to the approval of the Distributing Agent. Title to the rubber passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

12. In cases where rubber is tendered on a proforma basis, pending the definite outturn of weights or quality, title passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

13. In cases where the services of a dealer are utilized, the RUBBER MANUFACTURER'S ENDORSEMENT on the reverse side of the purchase permit must be executed by the manufacturer and the purchase permit, in triplicate, forwarded to the respective dealer. The dealer will then present the purchase permit to the Distributing Agent, who will arrange for the delivery of the rubber described therein. Upon receipt and acceptance of the rubber, the dealer will execute the ACCEPTANCE in triplicate and surrender the purchase permit to the Distributing Agent, accompanied by a certified check or banker's New York draft covering the purchase price of the rubber plus the uniform freight charge. The Distributing Agent will then sign the purchase permit in triplicate, in the space provided therefore, and deliver the triplicate copy thereof to the dealer for transmittal to the manufacturer.

14. Dealers who act as agents for manufacturers and reweigh rubber at warehouses should, at the end of each month, render to the Distributing Agent an invoice covering charges for such services on the basis outlined in paragraph 11. The Distributing Agent will check the invoice against the deliveries and, if found to be correct, indicate his approval thereon and forward the invoice to Rubber Reserve Company for payment.

BALATA

15. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of balata, purchase permits will be issued by Rubber Reserve Company, in triplicate, and mailed to the manufacturer. (No change is being made in the form of purchase permit currently in use.) It is possible that in some cases the request will not be approved as submitted, and in these instances, the amount of balata specified in the purchase permit will represent the action of the Rubber Director.

16. Rubber Reserve Company will sell balata to manufacturers ex dock or ex warehouse at the option of Rubber Reserve Company at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

17. All sales of balata will be handled by D. D. Haldane, Distributing Agent, Rubber Reserve Company, 15 William Street, New York, New York. Purchase permits must be executed in triplicate and delivered to the Distributing Agent at the time the balata is received. The triplicate copy, which will represent an invoice, will be returned to the manufacturer for its files.

18. Balata will be sold on a 10% examination and net test weight basis or on 100% gross weighing and 10% or 100% taring basis, depending upon the grade and at the option of the Distributing Agent, and payment therefor will be required at the time of delivery, by certified check or banker's New York draft, payable to Rubber Reserve Company. It will, therefore be necessary for manufacturers or their dealer agents to weigh and inspect at point of delivery, thus eliminating the necessity for any adjustments after delivery. Rubber Reserve Company will absorb the cost of the weighing in all cases, but if delivery is made ex warehouse, the charge for reweighing shall be at current rates subject to the approval of Distributing Agent. Title to the balata passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

19. If the services of dealer agents are utilized, the procedure outlined above in paragraphs 13 and 14 under "Crude Rubber" will be followed.

GUAYULE

20. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of guayule, purchase permits will be issued by Rubber Reserve Company in triplicate, and mailed to the manufacturer. (No change is being made in the form of purchase permit currently in use.) It is possible that in some cases the request will not be approved as submitted, and in these instances, the amount of guayule specified in the purchase permit will represent the action of the Rubber Director.

21. Rubber Reserve Company will sell guayule to manufacturers ex dock or ex warehouse or delivered manufacturer's plant, at the option of Rubber Reserve Company, at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

22. All sales of guayule *in less than carload lots* will be handled by D. D. Haldane, Distributing Agent, Rubber Reserve Company, 15 William Street, New York, New York. Purchase permits must be executed in triplicate and delivered to the Distributing Agent at the time the guayule is received. The triplicate copy, which will represent an invoice, will be returned to the manufacturer for its files.

23. Guayule will be sold in less than carload lots on a 10% examination and net test weight basis and payment therefor will be required at the time of delivery by certified check or banker's New York draft, payable to Rubber Reserve Company. It will, therfore, be necessary for manufacturers or their dealer agents to weigh and inspect at point of delivery, thus eliminating the necessity for any adjustments after delivery. Rubber Reserve Company will absorb the cost of the weighing in all cases, but if delivery is made ex warehouse, the charge for reweighing shall be at current rates subject to the approval of Distributing Agent. Title to the guayule passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

24. If the services of dealer agents are utilized, the procedure outlined above in paragraphs 13 and 14 under "Crude Rubber" will be followed.

25. Sales of guayule to manufacturers in carload lots will be handled through the Sales Department of Rubber Reserve Company, 811 Vermont Avenue, N. W., Washington, D. C., rather than through the office of the Distributing Agent. Purchase permits will be issued in triplicate and forwarded to the manufacturer. Guayule, in carload lots, will in most instances be shipped direct to the manufacturer from the point at which the material is imported into the United States. As has been the custom heretofore, manufacturers will be invoiced by the Treasurer for guayule which is shipped in this manner. Invoices are payable immediately upon the receipt thereof, and remittance in the form of a certified check or banker's New York draft should be mailed to W. C. Beck, Jr., Treasurer, Rubber Reserve Company, 811 Vermont Avenue, N. W., Washington, D. C., accompanied by a copy of the invoice and the original and one copy of the purchase permit, with the MANUFACTURER'S ACCEPTANCE executed on the reverse side in the space provided therefor. The triplicate copy of the permit should be retained by the manufacturer for its files. Title to the guayule passes to the manufacturer upon the delivery of the material F.O.B. cars at the manufacturer's plant, and thereafter all risks are for the account of the manufacturer.

SYNTHETIC RUBBER

26. The procedure under which synthetic rubber is sold to manufacturers at the present time will be discontinued, and effective April 1, 1943, purchase permits will be issued in lieu of Synthetic Rubber Shipping Authorizations.

27. Upon receipt of an allocation from the War Production Board, Rubber Reserve Company will issue a purchase permit, in triplicate, and forward the purchase permit to the purchaser. The name and address of the Agent of Rubber Reserve Company which will supply the material will appear on the purchase permit.

28. If the amount of synthetic rubber allocated by the War Production Board is not in excess of a carload (approximately 60,000 pounds) the purchaser will be required to take delivery of the material in one lot. In cases where the amount allocated is in excess of a carload and the purchaser desires to secure delivery in more than one lot, the Sales Department of Rubber Reserve Company should be advised by telegraph to this effect immediately upon receipt of advice by the purchaser from the War Production Board of the amount allocated, and a separate purchase permit will then be issued to cover each delivery which is requested.

29. Rubber Reserve Company will sell synthetic rubber to purchasers F.O.B. the producing plant or ex warehouse, at the option of Rubber Reserve Company, at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

30. All sales of synthetic rubber will be handled by the Agent of Rubber Reserve Company designated in the purchase permit. Purchase permits must be executed in triplicate and delivered to the Agent, accompanied by appropriate shipping instructions, and a certified check or banker's New York draft, payable to Rubber Reserve Company. The triplicate copy of the purchase permit, which will represent an invoice, will be returned to the purchaser for its files. Title to the synthetic rubber passes when the material is delivered to the carrier at the producing plant, and thereafter all risks are for the account of the purchaser.

In cases of sales ex warehouse, title passes upon the exchange of the Agent's delivery order or warehouse receipt for the purchaser's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the purchaser.

31. In cases where the services of a dealer are utilized, the PURCHASER'S ENDORSEMENT on the reverse side of the purchase permit must be executed by the purchaser and the purchase permit, in triplicate, forwarded to the respective dealer. The dealer will then deliver the purchase permit to the designated Agent, accompanied by shipping instructions and a certified check or banker's New York draft. Upon shipment of the material, the Agent will sign the purchase permit, in triplicate, in the space provided therefor and deliver the triplicate copy thereof to the dealer for transmittal to the purchaser.

32. All synthetic rubber manufactured in government owned plants is produced to standard specifications and packed in uniform size containers, and, therefore, no occasion for quality or weight adjustments should arise.

LIQUID LATEX

33. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of liquid latex, purchase permits will be issued by Rubber Reserve Company in triplicate and mailed to the manufacturer. (No change is being made in the form of purchase permit currently in use.) It is possible that in some cases requests will not be approved as submitted, and in these instances, the amount of liquid latex specified in the purchase permit will represent the action of the Rubber Director.

34. In view of the need to make certain that stocks of liquid latex which are sub-standard or off quality, or which are in any danger of materially losing quality, are consumed before stocks which are better able to be stored for a long period, Rubber Reserve Company will issue purchase permits for such material first. Although every effort will be made to supply manufacturers with the grade and quality of liquid latex they request, the prior consumption of substandard or off quality stocks is of national importance and must be given first consideration. Manufacturers will, however, be furnished, in the discretion of Rubber Reserve Company, the nearest type of liquid latex which is practicable.

35. Rubber Reserve Company will sell liquid latex to manufacturers ex point of shipment, to be determined by Rubber Reserve Company, at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

36. Liquid latex will be sold to manufacturers by the following authorized Agents of Rubber Reserve Company:

American Anode, Inc., Akron, Ohio

Dunlop Tire & Rubber Corp., River Road and Sheridan Drive, Buffalo, New York

Firestone Tire & Rubber Company, Akron, Ohio

General Latex & Chemical Company, 666 Main Street, Cambridge, Massachusetts

Goodyear Tire & Rubber Company, Akron, Ohio

Heveatex Corporation, 78 Goodyear Avenue, Melrose, Massachusetts

Naugatuck Chemical Division of United States Rubber Company, 1230 Sixth Avenue, New York, New York

Revertex Corporation of America, 37-08 Northern Boulevard, Long Island City, New York

Charles T. Wilson Company, Inc., 120 Wall Street, New York, New York

Purchase permits must be presented to the Agent indicated thereon within thirty days from the date thereof, and delivery of the material covered thereby must be taken within the period specified on the purchase permit. All purchases of liquid latex shall be paid for in advance by delivering a certified check or banker's New York draft, payable to Rubber Reserve Company, to the Agent designated in the purchase permit. Title to the material passes to the manufacturer upon delivery of the certified check or banker's New York draft to the Agent of Rubber Reserve Company, and thereafter all risks are for the account of the manufacturer. All purchase permits not completed by delivery within sixty days from the date of issuance will be automatically cancelled. Delivery must be taken in one lot unless otherwise requested. Separate purchase permits will be issued in cases where more than one delivery is involved.

37. Re-useable drums owned by Rubber Reserve Company will be stencilled to indicate the governmental ownership thereof and when empty, should be returned to the Agent who shipped the material, or to the destination designated by such Agent, at Rubber Reserve Company's expense.

38. Manufacturers who purchase liquid latex from Rubber Reserve Company are expected to take every possible precaution to keep the latex in good condition, especially during winter months.

EXHIBIT A

RUBBER RESERVE COMPANY SELLING PRICES

(in cents per pound)

CRUDE RUBBER

Plantation Rubber

(in cases and/or bales, at Rubber Reserve Company's option)

Delivery ex dock or ex warehouse at Rubber Reserve Company's option plus a uniform freight charge of one half cent (½c) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1c) per pound for less than carload quantities based on net delivered weights.

Grade	*Civilian Use*	*Other Than Civilian Use*
#1X Ribbed Smoked Sheets	22½	40
1 " " "	22½	40
2 " " "	22¼	39¾
3 " " "	22	39½
4 " " "	21¾	39¼
5 " " "	20⅝	38⅛
#1X Thick Pale Latex Crepe	22½	40
1 " " " "	22½	40
2 " " " "	22	39½
3 " " " "	21¾	39¼
#1X Thin Pale Latex Crepe	22½	40
1 " " " "	22½	40
2 " " " "	22	39½
3 " " " "	21¾	39¼
#1X Thick Brown Crepe	21⅜	38⅞
2X " " "	21⅛	38⅝
3X " " "	20	37½
#1X Thin Brown Crepe	21⅜	38⅞
2X " " "	21⅛	38⅝
3X " " "	20	37½
#1 Thick Remilled Blankets	21⅜	38⅞
2 " " "	21¼	38¾
3 " " "	21⅛	38⅝
4 " " "	20⅝	38⅛
#1 Thin Brown Remilled Crepes	21¼	38¾
2 " " " "	21	38½
3 " " " "	20⅝	38⅛
4 " " " "	20	37½
Rolled Brown or Flat Bark	18	35½
#1 Smoked Blankets	21⅛	38⅝
2 " "	21	38½
3 " "	20¾	38¼
Claro Brand 1XRSS	22½	40
#1XRSS Trimmings	22	39½
Sole Crepe Trimmings	22	39½
#1X Thin Pale Crepe Trimmings	22	39½
R.C.M.A. Wtmkd. Crepe #16	26⅜	43⅞
" " " 17	25⅞	43⅜
" " " 18	24⅜	41⅞
Sole Crepe	22½	40

Wild Rubbers

(in cases and/or bales, at Rubber Reserve Company's option)

Delivery ex dock or ex warehouse at Rubber Reserve Company's option plus a uniform freight charge of one half cent (½c) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1c) per pound for less than carload quantities based on net delivered weights.

Grade		*Civilian Use*	*Other Than Civilian Use*
Uncut Fines	Crude	15	29
Cut Fines	Crude	15½	29¾
" "	Washed & Dried	22½	40
Islands Fine	Crude	14⅝	28¼
" "	Washed & Dried	22½	40
Weak Fine	Crude	14⅛	28⅛
" "	Washed & Dried	21⅜	38⅞
Cameta	Crude	9¾	20¼
"	Washed & Dried	21⅛	38⅝
Upriver Coarse	Crude	12⅝	26⅛
" "	Washed & Dried	20¼	37¾
Manicoba	Crude	12¼	25⅜
"	Washed & Dried	20¼	37¾
Manicoba Chorro (Ceara Scrap)	Crude	9⅝	21⅞
" "	Washed & Dried	18	35½
Central Scraps	Crude	12¼	25⅞
" "	Washed & Dried	19½	37
Caucho Ball	Crude	11⅝	24¾
" "	Washed & Dried	19½	37
Panama Slab	Crude	9⅝	21⅞
" "	Washed & Dried	18	35½
Mangabiera	Crude	8½	19¾
"	Washed & Dried	18	35½
Cameroons	Crude	16¼	31¼

Guayule

(in cases)

Delivery ex dock or ex warehouse or FOB cars Manufacturer's plant at Rubber Reserve Company's option plus a uniform freight charge of one half cent (½c) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1c) per pound for less than carload quantities based on net delivered weights.

Grade	*Civilian Use*	*Other Than Civilian Use*
Guayule in carload lots	17½	31
Guayule in less than carload lots	18	31½

BALATA

(in cases and/or bales, at Rubber Reserve Company's option)

Delivery ex dock or ex warehouse at Rubber Reserve Company's option plus a uniform freight charge of one half cent (½c) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1c) per pound for less than carload quantities based on net delivered weights.

Grade	*Civilian Use*	*Other Than Civilian Use*
Surinam Sheet	42½	42½
Venezuelan Block	40¼	40¼
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Panama Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Coquirana Washed and Dried	23¼	23¼
Coquirana Crude	19½	19½

SYNTHETIC RUBBER

(in cartons and/or bags)

Delivery F.O.B. producing plant or ex warehouse at Rubber Reserve Company's option plus a uniform freight rate of one half cent (½c) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1c) per pound for less than carload quantities based on net delivered weights.

Type	Civilian Use	Other Than Civilian Use
GR-M (Neoprene)	*	45
GR-S (Buna-S)	*	36
GR-I (Butyl)	*	33

* To be determined later.

LIQUID LATEX

(In cents per pound of total dry latex solids)

Delivery ex dock or ex warehouse, at Rubber Reserve Company's option, plus a uniform freight charge of one-half (½) cent per pound, based on total dry latex solids weight, for tank-car and carload quantities (at the minimum weights provided below) or one (1) cent per pound for less-carload quantities based on the net dry latex solids weights.

Normal

	Civilian Use	Other Than Civilian Use
Tank Car Lots	26	43½
Carload Drums (Minimum car 11,500 pounds T.D.L.S.)	28¼	45¾
Less Carload — 10 drums (1,400 pounds T.D.L.S.) or more	28¾	46¼
1 Drum to 10 Drums (140 to 1,400 pounds T.D.L.S.)	29¼	46¾
Less than 1 drum (1 to 140 pounds T.D.L.S.)	36¼	52¾

Creamed (Approximately 60%-65%)

Tank Car Lots	26¾	44¼
Carload Drums (Minimum car 19,300 pounds T.D.L.S.)	28½	46
Less Carload — 10 Drums (2,400 pounds T.D.L.S.) or more	29	46½
1 Drum to 10 Drums (240 to 2,400 pounds T.D.L.S.)	29½	47
Less than 1 Drum (1 to 240 pounds T.D.L.S.)	35½	53

Centrifuged (Approximately 58%-63%)

Tank Car Lots	27¾	45¼
Carload Drums (Minimum car 19,500 pounds T.D.L.S.)	29½	47
Less carload — 10 Drums (2,400 pounds T.D.L.S.)	30	47½
1 Drum to 10 Drums (240 to 2,400 pounds T.D.L.S.)	30½	48
Less than 1 Drum (1 to 240 pounds T.D.L.S.)	36½	54

When approved by Rubber Reserve Company, carload prices may be applied to mixed full cars containing both normal and concentrated latex.

Heat-Concentrated (Approximately 70%-73%)

Carload Drums (Minimum car 26,000 pounds T.D.L.S.)	29½	47
Less Carload — 10 Drums (1,700 pounds T.D.L.S.) or more	30	47½
1 Drum to 10 Drums (170 to 1,700 pounds T.D.L.S.)	30½	48
Less than 1 Drum (1 to 170 pounds T.D.L.S.)	36½	54

Recent Price Interpretations

The following price interpretations of specific price schedules and regulations directly affecting the rubber industry were recently announced by the Office of Price Administration:

Price Schedule No. 82 (Wire, Cable and Cable Accessories)—In determining maximum prices for used wire and cables, if a seller sold used wire and cable on October 15, 1941, he should apply to his sales the average percentage margin over his net invoice and cost, Section 1349.20 (c); if the seller did not sell used wire and cable on October 15, 1941, he must report to OPA his proposed price, which may be disapproved by OPA within 30 days after receipt of the report, Section 1349.20 (d).

Maximum Price Regulation No. 149 (Mechanical Rubber Goods)—The following are mechanical rubber goods if made in whole or in part of rubber: abrasive wheels, brake lining, chute lining, clutch facings, engraving rubber, horseshoe pads, keg bumpers, leak-proof gasoline tanks, lineman's blankets, offset blankets, oil well specialties, printer's blankets, printing plate material, rubber bearings, rubber paint, rubber putty, rubber molds (*i.e.*, molds made of rubber), sheet rubber, slab rubber, stamp rubber, table tops, type and logotype rubber, and windshield wiper blades.

In addition to the products specifically excluded by Section 1315.31 (a) (3) the following are not "mechanical rubber goods": bathing apparel, dental goods, waterproof rubber footwear, gloves, household goods, laboratory supplies, latex products, other than foamed latex products, proofed goods, (*i.e.*, rubberized fabrics, tires and tubes), and accessories and repair materials or toys and novelties.

Develop Army Jungle Boots

A new type jungle boot, developed by the U. S. Rubber Co. in collaboration with Army officers in the tropics, has been announced. It is designed to give our soldiers foot protection without heat during prolonged work in wet jungles. High camouflage green colored canvas uppers protect feet and ankles against tropical undergrowth, make it possible for the boots to dry out quickly, and withstand frequent soakings. Heavy rubber soles with cleats give sure-footedness for mountainous marching. Thick duck insole gives greater comfort. Due to special lacings, boots can be pulled on and off easily, and worn partway open.

Chicago to Hear Winkelmann

Dr. H. A. Winkelmann, technical director of the Dryden Rubber Co., will be the principal speaker at a meeting of the Chicago Group, Rubber Division, A.C.S., to be held on Friday, April 30, at the Morrison Hotel, in Chicago. Dr. Winkelmann will talk on "A Comparison of the Synthetic Rubbers," after which he will conduct an open forum with the assistance of a "board of experts." Any question pertaining to synthetic rubber may be presented to the "experts."

Achieve Ten-Year Safety Record

Van Cleef Bros., of Chicago, Illinois, recently celebrated a record of ten years of employment without a single lost-time accident. The achievement, representing more than 3,500,000 man-hours of production without serious accident, was observed by the company with fitting ceremonies at a dinner party held in Chicago late in February. More than 200 employees attended the dinner. The firm, established in 1910, has long been an exponent of safety measures in the rubber industry. It manufactures a wide range of rubber products, including friction and insulating tapes, rubber cements, rubberized fabrics, and mechanical goods.

Fete Mold Company Founders

The three surviving founders of the Mechanical Mold & Machine Co., of Akron—George C. Koch, Arthur I. Kittinger and Fred J. Pfeifle—were given a surprise celebration at the company's plant on March 17. The celebration, staged by the company's employees, commemorated the thirtieth anniversary of the founding of the company. A special toast was drunk in memory of the late Howard A. Tham, fourth founder of the concern.

Longer tractor tire life and better service are said to be assured in a new method of farm tire care made available to farmers by Goodyear. Called the Solution 100 Method, it includes the filling of each tractor-tire tube to 100% of its capacity with water or calcium chloride solution.

Free license to the Mareng Cell has been granted to the government by the Glenn L. Martin Co., Baltimore, Md. The cell, developed in 1940, is the basis of the self-sealing fuel tank and other self-sealing devices.

Successful application of synthetic rubber to industrial tires has been reported by Goodrich. The tires are of the press-on type for use on industrial power trucks and are reported to be holding up well in service.

A third all-Navy "E" award has been won by the Farrel-Birmingham Co., Inc. Each of the company's plants—two in Connecticut and one in New York—is now privileged to fly the Navy "E" burgee with two white stars added.

VULPRENE

Replacement for Crude and Reclaimed Rubber

VULPRENE is the generic name for a series of long-chain polymers, similar to Norepol, and derived from fatty oils. They are available in various forms, from viscous through tough rubber-like vulcanizates, and are suitable as replacement materials for crude and reclaimed rubber in insulation, coating and molded goods where extreme flexibility, tensile and abrasion are not required. They can be compounded, milled and vulcanized in the usual manner.

Other Products for Use as Replacements, Modifiers and Extenders for Latex, Reclaims and Synthetics

RESIN AND LACQUER EMULSIONS—These emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents; in *Coatings* to produce adherent pigmented or clear coatings on paper, fabric, and rubber and as intermediate coats for lacquer on rubberized cloth; in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives,* for paper, for leather to cloth, and cloth to cloth.

VULPRENE SOLUTIONS AND DISPERSIONS. These forms of Vulprene are being used for adhesive tapes, marking papers, water-resistant coatings, etc. *Vulprene Latex* is used as a latex extender particularly as shoe adhesives, for impregnation of paper, can sealing compounds and coating materials.

ALKYD 18—an alkyd type resin emulsion which is non-yellowing and non-oxidizing. Film is water-white and non-tacky. Preferred where slight oxidizing action may be considered harmful to rubber. Extender for latex in coating, combining and impregnating process.

EMULSION 58-8—a series of emulsified elastomers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining.

PIGMENT BASES—concentrated aqueous dispersions of pigments in resin bases, available in all shades and viscosities, suitable for spreading, spraying, etc.

Also Acrylic, Vinyl, Maleic, Phenolic, Hydrocarbon, Ethyl Cellulose, Cellulose Acetate and Nitrate emulsions and solutions for various applications.

WE'RE SORRY!—We have received so many inquiries in recent weeks for data and samples of our products that it has not always been possible to acknowledge them promptly. If you have not received a reply, please bear with us and we'll try to answer your request as soon as possible.

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Rubber Substitutes • *Rubber Synthetics* • *Resin, Lacquer Emulsions*

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Testing Proposed Substitutes for Rubber

SINCE the beginning of the rubber shortage, many samples of proposed substitutes for rubber have been submitted to the National Bureau of Standards for test. Although many different materials have been proposed, a great majority of them fail to meet certain simple tests that have been applied. In view of this situation, the Bureau has described tests to determine whether or not a proposed material possesses the basic characteristics of rubber to a sufficient degree to warrant further consideration and laboratory study. These tests follow:

Characteristic properties of rubber.—If a material is to serve as a practical substitute for rubber, it should be extensible, resilient, tough, waterproof, resistant to drying, and relatively unaffected by summer heat and winter cold. Simple tests, which anyone can apply, to determine these properties are as follows:

1. Cut a strip of the material and note how much it can be stretched before it breaks. Observe also whether the broken portions snap back or whether they recover only slowly. If a material will snap back after being stretched to three or four times its original length, it has promise as a substitute for rubber; if it breaks before being stretched this much or if it recovers slowly, its probable usefulness will be correspondingly limited. If it cannot be stretched to at least double its original length, it can scarcely be considered for use in the place of rubber.

2. Try to cut the material with the thumbnail. If it resists cutting, it merits further consideration, but if it can be picked to pieces or if it crumbles when rolled vigorously between the thumb and forefinger, it could be considered only for minor uses, such as erasers.

3. Soak a thin piece of the material in water for a few days and note whether it disintegrates, swells, or becomes weaker than the original material. Although inability to withstand water need not bar a material from further consideration, it should be borne in mind that in most applications of rubber, waterproofness is an important consideration.

4. Keep a thin piece of the material in a warm, dry place for a week and note whether it retains its original extensibility and resilience. If it dries out or becomes hard and brittle, it can be of no use as a substitute for rubber.

5. Put some of the material in the freezing compartment of an electric refrigerator for a few hours and note whether it retains its extensibility or whether it becomes hard and brittle. Also put some of the material into boiling water and look for evidences of softening and melting. A material which does not withstand these extremes of temperature could replace rubber in a few applications, but would not be generally useful.

Factice and gels.—A majority of the proposed substitutes submitted to the Bureau represent two types of products which, though well-known to industry, apparently have been independently rediscovered by many inventors. These products are *factice,* prepared by the vulcanization of oils; and *gels,* made from glue or gelatine. A brief description of these materials will serve to indicate the respects in which they fail to meet the requirements outlined in the foregoing paragraphs as a general substitute for rubber.

The public seems to be almost entirely unfamiliar with factice, although it is an important industrial material and was known before rubber was introduced in Europe. The rubber-like properties of factice are such that it is often called "rubber substitute" by the trade. Commercial factice is of two main types. A

brown or dark factice is prepared by heating vegetable or fish oils with sulfur. The vegetable oils may include rapeseed, linseed, corn, cottonseed, poppy seed, and castor oils. A white, or light, factice is prepared by the cold vulcanization of an oil with sulfur monochloride; rapeseed or corn oil is favored for the purpose.

The principal application of factice is as a compounding ingredient for which purpose it has been used for nearly 100 years. It is compatible with synthetic as well as with natural rubber and is employed in combination with them in making insulated wire, druggists' sundries, erasers, stationers' goods, and various other products. The use of factice alone is limited to minor products, such as Artgum erasers, because, in spite of many efforts, it has never been developed with properties which can meet the tests of extensibility and resilience, toughness, and resistance to temperature change shown to be necessary for a general rubber substitute.

Many persons are unaware of the fact that rubber-like compounds made from glue and gelatine have long been known and used in industry. They were extensively employed at one time in making printers' rolls, but were displaced to a large extent by synthetic rubber in the 1930's. With the present rubber shortage, however, they are coming back into use. The compounds from which printers' rolls are made usually contain glue or gelatine, water, glycerine, and a tanning agent. The glycerine keeps the compounds from drying out, while the tanning agent stabilizes the compound and keeps it from softening with heat. At best, the gels made from glue and gelatine are so inferior to rubber in extensibility, toughness, and resistance to water that it is doubtful whether they will satisfactorily replace rubber in any but a few special products.

Report on Hose Wrapper Accident

AN OPERATOR was wrapping hose on a wrapping machine. He was being followed by his helper who was puttting on the second wrapper. The operator finished his wrapping and thought his helper had also finished his. The operator stopped the machine by pressing on the foot treadle and at the same time he reached for the hose with his right hand.

Just as he touched the hose which had almost stopped revolving his helper also stepped on the treadle. This caused the machine to start up again with the result that the operator's hand was caught between the hose and rollers on which it revolves. His helper said he did not realize that the operator had already stepped on the treadle to stop the machine.

The operator sustained severe contusions to his right forearm with possible tendon damage which may result in some permanent disability. The operators and helpers on these machines have been carefully reinstructed not to reach for the hose until it has stopped revolving and only the operators in the future are to stop and start the machine.

News Letter, National Safety Council.

An entirely new **thermometer**, said to incorporate every new improvement heretofore added to existing glass thermometers, plus many newer improvements, has been announced by the American Schaeffer & Budenberg Instrument Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn. It is furnished in a pressed steel case.

New and Better
GAMMETER'S
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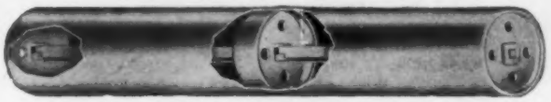

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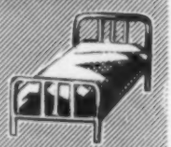

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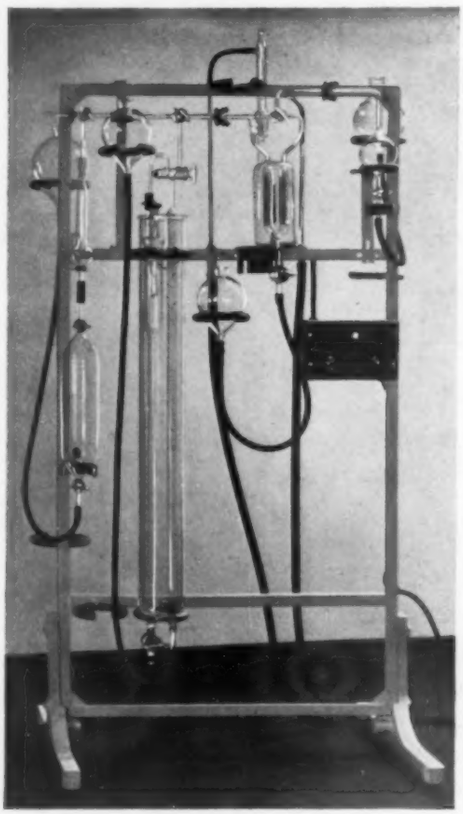
NEW EQUIPMENT

Sargent Butadiene Gas Analyzer

A gas analyzer for the determination of butadiene in the presence of other olefinic hydrocarbons in amounts ranging from 0.2 to 100% was recently introduced by E. H. Sargent & Co., 155 East Superior St., Chicago, Ill. The apparatus shown in the accompanying illustration is based on the Diels-Alder reaction in-



volving the addition of a conjugated olefine to maleic anhydride with the formation of a six-membered ring containing one double bond. The analyzer was developed by the Universal Oil Products Co. and Sargent, in accordance with the specifications of the former company.

The apparatus consists of a 500 ml. gas sampler, a drying tube, an U. S. Bureau of Standards type burette and compensator assembly, the absorption pipette containing maleic anhydride and an expansion bulb, together with the necessary leveling bulbs for passage of the gas sample. Connections between the burette, absorption pipette and the expansion bulb are made with spherical interchangeable ground joints firmly held with special clamps providing considerable flexibility for connections and thus reducing materially possibility for breakage of glassware. Mercury is used as the confining liquid except in the case of the gas sampler where a saturated sodium sulfate solution is used.

The absorption pipette consists of a "U" tube filled with glass beads of 5 mm. diameter to present a large surface for the absorption of butadiene by the maleic anhydride. The "U" tube is ring sealed into a cylindrical glass jacket which is provided with an inverted well for the insertion of a cartridge heater of sufficient heating capacity to raise the water in the cylindrical jacket to the boiling temperature in order that the maleic anhydride in the "U" tube may be kept molten. Steam generated in the water jacket is condensed by a 4-inch reflux condenser. The apparatus is also provided with a control panel containing a switch controlling the heater and another switch and neon light for actuating the compensator which indicates the attainment of atmospheric pressure in the system. All glass parts are mounted on adjustable supports on a sturdy steel frame finished in white enamel.

Precision-Freas Aging Oven

The Precision-Freas Constant Temperature Aging Ovens, manufactured by the Precision Scientific Co., 1750 No. Springfield Ave., Chicago, Illinois, are finding widespread application in rubber laboratories, particularly in connection with the testing of synthetic rubber specimens. These aging ovens have a temperature range of 35 to 180° C. The oven proper is a

standard mechanical convection model containing a sample rack for suspension of the specimen so that it does not touch an adjacent specimen. Without using shelves, the sample rack makes it possible to treat 110 samples simultaneously.

Two types of sample racks are available. The single-clip rack has 110 clips at the top only for suspending specimens up to 12 inches long, while the double-clip rack has 110 clips at both top and bottom and is adjustable so that specimens up to 12 inches may be stretched taut if desired. The spring clip grips only a

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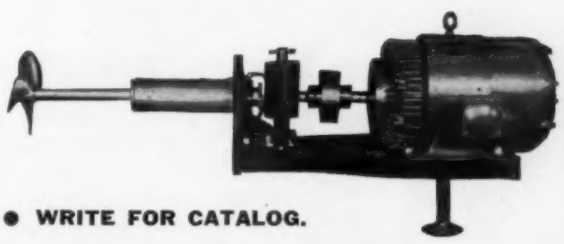

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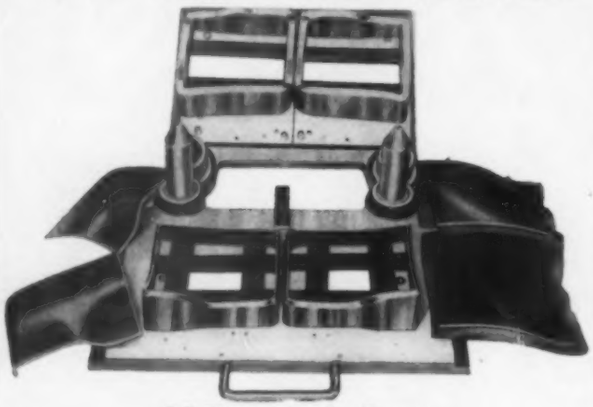

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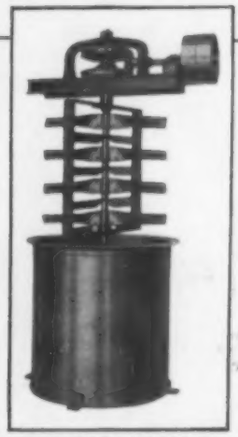

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very small portion of the sample, leaving the rest fully exposed for undisturbed heat treatment. All clips are spaced on 1½-inch centers. If desired, the sample racks may be removed and conventional flat shelves inserted, two removable shelves being included.

A feature of the Precision-Freas aging oven is the employment of mechanical convection heat transfer by means of forced air circulation produced by a powerful turbo-blower, not an ordinary fan. Mechanical convection aided by a sensitive hydraulic thermostat is said to insure a constant temperature and uniform heat transfer throughout all regions of the work chamber. Another feature is an air flow control damper which makes it possible to control the air velocity across the working chamber from approximately 75 to 250 feet per minute, such control being extremely important when treating rubber or other substances susceptible to oxidation.

The inside dimensions of the oven are 19-inch width, 19-inch depth, and 19-inch height; outside they are 49-inch width, 27-inch depth, and 33-inch height. Wattage is 2700. Standard equipment supplied includes single or double-clip rack, two removable stainless steel shelves adjustable for height on shelf racks, a 0 to 300° C. mercury thermometer with holder; a Neon pilot lamp, and a terminal block for connection directly to power line.

BRIEFS . . .

A new series of **electronic level controls,** designed particularly for hazardous location mounting, has been announced by Photoswitch, Inc., Cambridge, Mass. The equipment is supplied for use with conductive liquids of an explosive nature.

A new method of **automatic temperature control** for the Niagara Aero Heat Exchanger as used for cooling industrial liquids has been developed by the Niagara Blower Co., New York City. The method is based on controlling the amount of outside air passed through the evaporative cooling chamber rather than altering the flow of liquid being cooled.

An improved **fume exhauster**, so designed that fumes, gases, dust, filings and grinding compounds do not come in contact with the motor, has been placed on the market by the Chelsea Fan & Blower Co., Inc., Irvington, N. J.

A **voltage tester**, which features no meter, no switching and no tip jacks, and which reads like a thermometer, has been developed by the Superior Instruments Co., New York City. In use, the needle-pointed test prods are simply connected across any line and voltage, frequency, type of current, etc., is instantly indicated.

A new **percentage timer**, which automatically controls the percentage of time at which any A.C. circuit can periodically be closed or opened out of a definite length of a time cycle, has been made available by the R. W. Cramer Co., Inc., Centerbrook, Conn.

REVIEWS

BOOKS

Trees and Test Tubes: The Story of Rubber. By Charles Morrow Wilson. Published by Henry Holt & Co., 257 Fourth Ave., New York City. 5½ x 8¼ in. 352 pp. $3.50.

(Available from Book Department, RUBBER AGE)

Based upon personal knowledge and apparent careful research, this book surveys the rubber situation in a realistic, practical manner. It acquaints the reader with the Amazon jungles and the islands of the Far East, and with the economic, political and physical aspects of rubber cultivation. It describes the work of the pioneers of the modern rubber industry, especially the fundamental work of Charles Goodyear. It describes the extent to which our civilization has become dependent on rubber. And it traces the development of synthetic rubber.

While fully acknowledging the superiority of some properties of the newer synthetic rubbers over those of natural rubber, the author still takes the position that despite all of the acclaim given to the synthetics our present crisis would be infinitely less acute if a dependable, permanent supply of nature rubber could be assured. By taking the reader back to the Amazon jungles, where natural rubber began as a world commodity, and recounting the story of what happened in that area, he clearly indicates just how improbable such a solution is and why it will be a long, long time before Amazonian rubber can come to our rescue.

Charles Morrow Wilson, the author, is a prolific writer, his last book being *Ambassadors in White.* Like the latter book, the current one is based upon years of first-hand experience in the American Tropics. Furthermore, Mr. Wilson has lived on one of the experimental rubber plantations of Central America and has closely observed the efforts being made to revive the rubber industry in Latin America. Planned long before the war, the subject matter is most up-to-date, even to the inclusion of the complete text of the Baruch Rubber Report. Mr. Wilson combines his facts with an even flow of words, constantly using analogies to convey the meaning of technical rubber terms to the layman.

The book has twelve chapters in all, as follows: Rubber Is Vegetable; Rubber Before Goodyear; Charles Goodyear; Amazon Rubber; Malayan and East Indian Rubber; Henry Fordlandia; Synthetics or Elastomers; Our Rubber-Dependent World; Singapore and Japan; Crisis; War and Rubber; Looking Forward. Several of the chapters are illustrated, many of the illustrations being reproductions of photographs taken by the author in his travels. In addition, there is a chronology of Goodyear's life, an extensive bibliography, and a cross-referenced index.

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A.S.T.M. Standards on Rubber Products. Prepared by Committee D-11 on Rubber Products. Published by the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Penna. 6 x 9 in. 301 pp. $1.75.

This latest compilation of all A.S.T.M. standards on rubber products (as of February, 1943) includes 41 specifications, physical and chemical tests for a wide range of rubber

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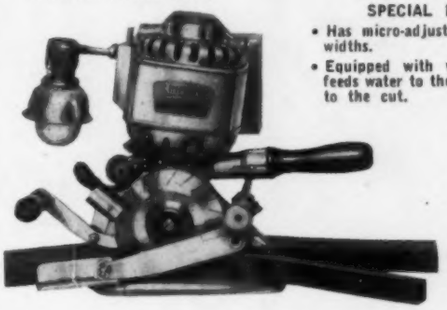

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products, and the emergency alternate provisions and other emergency methods issued to expedite procurement and conserve crude rubber. Seven emergency alternate provisions are given. Test methods outlined include those for chemical analysis, tension, accelerated aging, resistance to light checking and cracking, adhesion, compression, ply separation, and changes in liquids. Purchasing standards cover electrical gloves, electrical matting, and friction tape, in addition to various types of rubber compounds for insulated wire and cable. An emergency specification covers sheath compound where extreme abrasion is not required. Some of the relatively newer work of Committee D-11 is represented in standard methods of testing rubber cement, latex, sponge rubber products, and battery containers. A 14-page bibliography lists many references which are comprehensive and which cover some of the more important recent publications.

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1942 Book of A.S.T.M. Standards. (In Three Parts). Part I—Metals, 1690 pages. Part II—Non-Metallic Materials—Constructional, 1518 pages. Part III—Non-Metallic Materials—General, 1670 pages. Each part, 6 x 9 in. Published by the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Penna. Prices (cloth binding): Any one part, $9.00; any two parts, $18.00; all three parts, $27.00; Supplements, $3.00 for each part, each year. Note: For half-leather binding add $1.00 for each part and each supplement part.

Issued in three parts as usual, this book of standards contains in their latest approved form all of the A.S.T.M.'s widely used specifications and tests for materials, definitions, and recommended practices. There are 1,090 specifications and standard methods, covering more than 4,900 pages. Continuing the policy first used with the 1939 book (the last one issued, the book being published triennially), this new edition gives all specifications, whether formal standards or tentative.

Each part of the 1942 Book has a complete subject index. The Part II index, for example, covers 32 pages, and there are two extensive tables of contents, the first listing all standards under general materials headings and the second listing them in order of the sequence of the serial designations. These features are intended to facilitate reference to any subjects covered. Some idea of the large increase in subject matter is indicated by the fact that whereas the 1939 edition listed 866 standards in 3700 pages the new edition lists 1090 standards in 4900 pages.

Part I of the 1942 Book contains 361 specifications and tests, of which about 200 cover ferrous metals (steel, cast iron, etc.), with the balance applying to non-ferrous metals, copper, aluminum, and testing methods. Part II has 425 specifications and tests, many of which are extensively used, including those on cement, brick and building tile and concrete aggregates. Part III has 392 specifications and tests, many of which represent the newer phases of the Society's work, including those on plastics, rubber, soaps and other detergents, and paper and paper products. Specifications for rubber products cover fire hose, belting, gloves, matting, tape, wire and cable, sponge rubber, and hard rubber, while test methods cover analysis, tension, accelerated aging, abrasion, adhesion, set, hardness, and light checking.

To keep the books up to date in 1943 and 1944, a supplement will be issued to each part in each of these years. As a special service with the 1942 Book of Standards, there is a complete 200-page Index to Standards which is furnished without additional charge, a copy accompanying the purchase of each part or the complete set.

•

1942 Yearbook of the Storage Battery Manufacturing Industry. Association of American Battery Manufacturers, 2706 First Central Tower, Akron, Ohio. 5½ x 8¼ in.

The latest year book of this association is divided into three sections: The Association; The Industry; and Statistics of Raw Materials. The standard guarantee and adjustment policies of the group are also included, as is its constitution.

Mechanical Drawing. By E. Kenison, J. McKinney and T. C. Plumridge. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. 5½ x 8¼ in. 330 pp.

The importance of mechanical drawing to mechanics and engineers is of course well known but teaching methods vary with every institution of learning. Accordingly, text books of this type, which cover the skills and technical knowledge needed in the specialized field of drawing, are particularly welcome. The present volume gives a certain amount of "drill" work in the use of the instruments used in mechanical drawing and shows the student how to become adept in making neat and accurate drawings. The book is profusely illustrated, as a good text book should be, and gives many interesting problems in drawing which will help the student to develop his power of visualization and to create his own ideas. Although designed for use in schools, the book is also of value to manufacturers now conducting their own training courses in various subjects in connection with the war program.

•

A.S.T.M. Standards on Electrical Insulating Materials. Prepared by Committee D-9 on Electrical Insulating Materials. Published by the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Penna. 6 x 9 in. 441 pp. $2.50.

The large number of standard specifications and test methods on electrical insulating materials, developed through the work of Committee D-9, comprise this latest edition of standards, together with considerable supplementary material. There are groups of specifications and tests on insulating varnishes, paints, lacquers, and their products, and molded insulating materials, including plastics. The annual report of Committee D-9 and several condensed reports on the significance of tests, as well as an extensive report on "Methods Used for Determination of the Oxidation Tendency of Insulating Oils," are included. Data on rubber blankets, gloves, insulating tape, and matting, as well as on hard rubber, is brought completely up to date. As usual, there is a carefully compiled, completely cross-referenced index.

•

Plane Trigonometry Made Plain. By Albert B. Carson. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. 5½ x 8¼ in. 389 pp. 198 ill. $2.75.

Still another in the series of "how-to-do-it" books being published by the American Technical Society in connection with the so-called Victory Training Program, this one deals with the fundamentals of plane trigonometry, but in greater detail than is done in most texts. A good deal of attention is devoted to numerical work and emphasis is placed on the application of trigonometric principles in the solution of everyday problems. Numerous questions with answers are included, while a summary with practice problems is furnished at the end of each chapter. The book also contains tables of logarithms of numbers, natural trigonometric functions, and logarithms of trigonometric functions. The book has 15 chapters in all and is indexed.

•

Index to A.S.T.M. Standards. Issued by the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Penna. 6 x 9 in. 225 pp.

Issued as an adjunct to the 1942 A.S.T.M. Book of Standards, this index enables any of the 1100-odd standard specifications and tests in the volumes to be located readily. It is also of value to those who wish to determine whether the Society has issued standard specifications, test methods or definitions covering a particular engineering material or subject. All items are listed under appropriate key-words according to the subjects covered. As a convenience, a list of the specifications and tests in numeric sequence of their serial designations is included.

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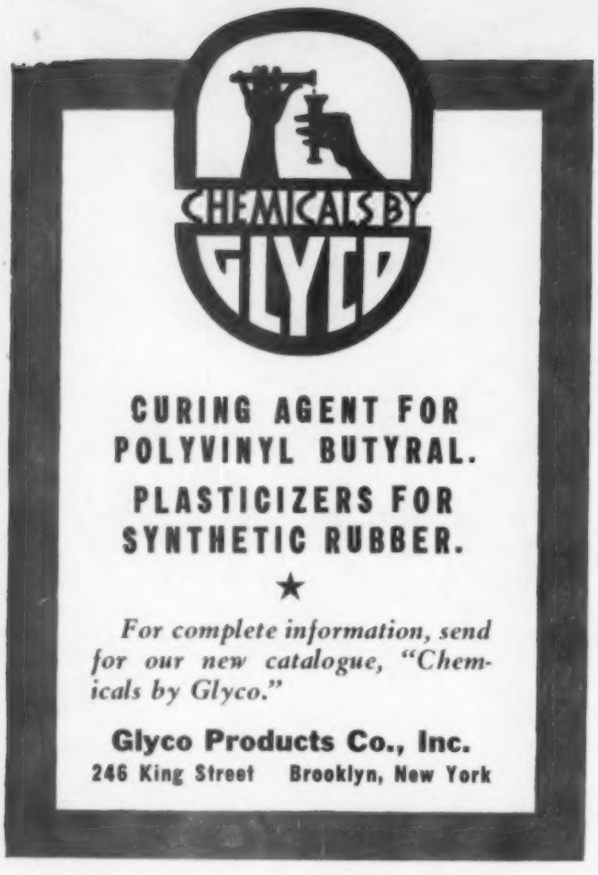

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Supplement to "Replacement of Thermatomic Carbons and Furnace Type Blacks in Rubber Compounds by Decreased Loadings of Channel Black and Mixtures of Channel Black and Whiting." By F. H. Amon and B. A. Wilkes. Godfrey L. Cabot Co., Inc., 77 Franklin St., Boston Mass. 8½ by 11 in. 7 pp.

In initial studies on this subject (see RUBBER AGE, February, 1943, p. 444), the authors attempted to replace 30, 60 and 90 parts of various so-called soft blacks in a typical GR-S (Buna S) compound with various selected combinations of Spheron No. 9 and Atomite Whiting. The results indicated their ability to reproduce in considerable detail the physical properties of 30 and 60 parts of the blacks in question, but time did not allow them to reproduce to a satisfactory degree the physical properties of the 90 part loadings of these blacks. This supplement, divided into pages so that they may be inserted in the original bulletin on the subject, describes work substantiating the prior opinion that by increasing the loading of Spheron No. 9 to 28 and 32 parts, with a suitable decrease in the loading of Atomite, a better reproduction of the physical properties produced by 90 parts of the so-called soft blacks can be obtained.

•

Cabot Carbon Blacks in GR-P-Reclaim Stocks. By B. A. Wilkes. Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass. 9 x 11½ in. 34 pp.

This bulletin gives the results of a study of the effect of channel black loading and the effect of grade of channel black in blends of GR-P (Thiokol N) and reclaimed rubber. The first part of the report discusses compounding ingredients and general observations (mixing, curing, appearance, etc.), and outlines a typical laboratory milling schedule. The remainder of the report consists of a number of specific formulas and test results. Formulas tested included those comprising 70 parts of GR-P and 30 parts reclaim, 50 parts of GR-P and 50 parts reclaim, and 30 parts of GR-P and 70 parts reclaim. A comparison of the physical characteristics of compounds based on 70 parts of GR-P and 30 parts of reclaim versus compounds based on 30 parts of GR-P and 70 parts of reclaim is included.

•

Neoprene Latex Type 571. (Report No. 43-2). By B. Dales, H. H. Abernathy, and R. H. Walsh. Issued by Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼ x 9½ in. 48 pp.

The properties, handling, compounding and processing of Neoprene Latex Type 571—a general-purpose latex suitable for practically all applications—are discussed in this report. Sufficient information is given to enable latex technicians to develop mixes suitable for the production of nearly all the articles normally made from natural rubber latex. A general discussion of methods of preparing materials for addition to the latex is included and many typical compounds are shown. The report is divided into three parts: General Description and Compounding Principles; Uses of Neoprene Latex Type 571; and Preparing and Using Neoprene Latex Compounds. An index is included for convenience.

•

Staybelite Resin. Naval Stores Department, Hercules Powder Co., Inc., Wilmington, Delaware. 8½ x 11 in.

Staybelite Resin, the hydrogenated rosin produced from southern pine, is discussed in this booklet. Physical and chemical properties of the material are given and major properties discussed. Among the applications cited in the booklet are its use in adhesives, rubber compounding, rubber reclaiming and in ceramics. The miscibility characteristics of the hydrogenated rosin with typical organic solids and compatibility of waxes with it are listed in tables.

Wartime Conservation. (Booklet B-3206). Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penna. 8 x 11 in. 96 pp.

This booklet contains recommendations by Westinghouse engineers for selecting, applying and using electrical equipment so as to achieve the best possible output with the greatest saving in critical materials. It covers up-rating of motors, thermal temperature loading of transformers, industrial network systems, line equipment and materials, and gives tips on saving and salvaging materials as practiced in various plants of the company. Many examples of how existing equipment can be made to give better service and greater output by up-rating or rebuilding with more efficient materials than originally used are included. Recommendations made in the booklet are in line with policies suggested by the War Production Board. The booklet is indexed for ready reference.

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Controlling Factory Production. Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York, N. Y. 8 ¼x 10½ in. 34 pp.

The means used to accomplish carefully planned production control in small, medium and large plants, thus enabling such plants to double their output without undergoing serious disruptions despite machine and manpower limitations, is the subject of this report. The report is concerned with the time element in manufacturing and in related functions, viz., the question of when given quantities of goods are to be produced. Much emphasis is placed on scheduling and progress control as fundamental considerations in production control, and the scheduling of work both in jobbing shops and in factories having continuous flow production is described. Separate descriptions are given of the scheduling in small, medium-sized and large shops. The functions of the foreman and the supervisor in executing planned production are outlined.

•

Teamwork for Victory. Automotive Council for War Production, New Center Building, Detroit, Mich. 8½ x 10½ in. 36 pp.

How well the automotive industry is meeting commitments made to the nation when the Automotive Council for War Production was born in the dark hours at the close of 1941 is told in words and pictures in this booklet. Specific gains in the fields of aircraft, tanks, combat vehicles, guns and ammunition, military vehicles, and marine equipment are discussed. Teamwork, as indicated in the booklet, is responsible for gains made to date and will be responsible for those in the future.

•

Hardness. By D. Landau. Nitralloy Corporation, 230 Park Ave., New York, N. Y. 6 x 9 in. 108 pp.

The French engineer, P. Roudie, has shown that by adopting a dynamic method of hardness testing he could, as a consequence, define hardness as a quantity of energy and, therefore, as a function of the three fundamental units of mass, length and time. This booklet amplifies Roudie's method. The subtitle of the booklet, "A Critical Examination of Hardness, Dynamic Hardness, and an Attempt to Reduce Hardness to Dimensional Analysis," makes clear the subject matter. An extensive bibliography on hardness is included.

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The Gas Mask. Office of the Chief of Chemical Warfare Service, War Department, Washington, D. C. 6 x 9 in. 24 pp.

Issued as Booklet No. 1 of the series of educational booklets planned by the Chemical Warfare Service to acquaint the public with its specialized work, this booklet is an illustrated digest of the history and development of the military gas mask. The training mask, military service mask, diaphragm mask, optical mask, and other types are described and illustrated, with brief mention made of the masks used by the Axis partners.

Improve the tack WITH

CRYSTEX insoluble SULPHUR

Crystex, an amorphous sulphur, improves the tack by preventing bin-cure and dryness which usually occur when a high percentage reclaim compound is used.

Crystex prevents bloom in uncured rubber stocks. It does not dissolve in rubber but will "stay put" at temperatures usually prevailing during storage periods. Crystex is of outstanding value when employed in the manufacture of stocks to be used for repair materials, in retread stocks, valve-patch frictions, and other products.

The characteristics of Crystex indicate that further uses may be found for this product in the rubber making industry.

OTHER RUBBERMAKERS' CHEMICALS

Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure
Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure
Carbon Tetrachloride, Carbon Bisulphide
Caustic Soda, Sulphur Chloride

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL CO.

420 LEXINGTON AVE., NEW YORK, N. Y.
444 LAKE SHORE DRIVE, CHICAGO, ILL.
624 CALIFORNIA ST., SAN FRANCISCO, CAL.
555 SO. FLOWER ST., LOS ANGELES, CAL.
424 OHIO BUILDING, AKRON, OHIO
NORTH PORTLAND, OREGON
HOUSTON, TEXAS APOPKA, FLORIDA

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, APRIL 10, 1943

Crude Rubber

AS indicated in our previous issue, the Rubber Reserve Company has issued a complete new schedule of prices for crude rubber, as well as balata and liquid latex. The new schedules is broken into two separate price indexes, one pertaining to rubber for use in civilian products and the other for rubber to be used in other than civilian products.

Since the greater consumption of rubber during 1943 will be in military products, the increase represents an all-around rise in cost to most rubber goods manufacturers. Price ceilings on products using the higher-priced rubber will be announced shortly by the Office of Price Administration. The new price ranges are indicated below, those for civilian use being the same as those which have heretofore applied.

Latin America continues to hold the spotlight of the crude rubber situation. Encouraging reports have been made on the progress in the various countries, but in at least two instances last month the suggestion has been advanced by Latin American interests that the price paid for the rubber be raised to guarantee greater production. In one case, the price suggested was one dollar a pound. Rubber from South America is now costing this country between 60 and 65 cents a pound, according to a recent statement by Douglas Allen, president of the Rubber Development Corp.

Major consideration is still being given to the health programs which are so essential before large hordes of tappers can be sent into the rubber areas of the Amazon and its tributaries. Considerable progress in the construction of comfort stations along the paths that must be traveled is reported. As an indication of the current thinking in South America, it is proposed to have a "task force" drop men by parachute into the jungles to expedite the handling of rubber. The plans would be based in Manaos. The plan is quite feasible, according to one of the Rubber Development Corp. representatives who thoroughly investigated its possibilities.

Prices shown below are those set by the Rubber Reserve Company:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21⅜	38⅞
Thin Brown Crepe, 1X	21⅜	38¾
Thick Remilled Blankets, #1	21⅜	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅛	38⅝
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Curde	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12⅝	26⅛
Upriver Coarse, Washed & Dried	20¼	37¾
Caucho Ball, Crude	11⅝	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¾	23¾
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¾
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

The scrap rubber situation, from all appearances, continues satisfactory, with agents of the Rubber Reserve Co. still busily engaged in grading and sorting the large amounts turned in during the recent scrap rubber drives. Tires turned in under the Idle Tire Purchasing Plan, unsuitable for recapping or retreading, are also finding their way into trade channels. An amendment to the scrap rubber price regulation provides that scrap rubber articles bought to be repaired or reconditioned so as to be capable of their original use need not be sold at scrap rubber prices. Prices below are ceilings on typical grades:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$18.00
Beadless truck tires	ton	24.00
Mixed truck tires	ton	18.00
Beadless passenger tires	ton	24.00
No. 1 passenger peelings	ton	47.50
No. 1 truck peelings	ton	47.50
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06¾
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¾
Black truck tubes	lb.	.05¼
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00
Black mechanical scrap, above 1.10	ton	20.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

Although the price of middling uplands on the Cotton Exchange swung in the relatively narrow range of 42 points since our last report, it has continued the upward trend evident in recent months. High for the period was 22.24 on April 1 and low 21.82 on March 15. The average price for the month of March was 21.98, based on 27 trading days, which compares with the average of 21.61 for February. The price moved upward slowly but steadily, with few reverses, in mid-March, passing the 22-cent mark on March 23. The upward tendency continued until the high of 22.24 for the period was reached, but the apparent weakness of the Bankhead Bill, the latest anti-inflation moves of the White House, and considerable liquidation, has turned the trend downward in the past few days, the price dropping to 21.90 today, April 10. Indicated cotton plantings this year have now been put at 23,270,000 acres by trade sources. Quotations for middling uplands on the Exchange follow:

	Mar. 13	April 10		
	Close	High	Low	Close
July	20.00	19.95	19.83	19.87
October	19.71	19.75	19.63	19.67
December	....	19.69	19.58	19.62

Reclaimed Rubber

Despite a slight reduction in the near-peak capacity maintained by the reclaiming industry in the past several months, reclaimers are still hard put to meet present demand. Lifting of the restrictions on all-reclaim camelback is believed to be responsible in good measure for the current demand. Most reclaimers are girding themselves to handle synthetic rubber scrap in the near future, and they are confident that such scrap can be handled on present reclaiming equipment with minor modifications. The manpower bogey still faces the industry, but thus far it has managed to operate at satisfactory levels. Prices shown below are ceilings on typical grades of reclaim:

Shoe				
Unwashed	lb.	.07	@	.07¼
Tube				
Black Tube	lb.	.11¼	@	.11½
Red Tube	lb.	.12	@	.12¼
Tires				
Black (acid process)	lb.	.07½	@	.07¾
Black, selected tires	lb	.06½	@	.06¾
Truck, Heavy Gravity	lb.	.08½	@	.08¾
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05½
White	lb.	.13	@	.13¾

Ducks

Enameling (single filling)	lb.	—	@	.44¼
Belting and Hose	lb.	—	@	.39
Single filling, A grade	lb.	—	@	.19¼
Double filling, A grade	lb.	—	@	.20¼

CHEMICAL MARKETS

New York, Mar. 13, 1943
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	42
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.43 @	.45
Beutene	lb.	.59 @	.64
B-J-F	lb.	.38 @	.43
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.38 @	.40
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.40 @	.47
Ethyl Zimate	lb.	— @	1.13
Ethylidine aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.40 @	.50
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.53
Pentex	lb.	.74 @	.84
Pheuex	lb.	.50 @	.55
Pip-Pip	lb.	— @	1.65
R & R 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	1.55 @	1.70
Rotax	lb.	.48 @	.50
Safex	lb.	1.15 @	1.25
Selenac	lb.	— @	1.25
SPDX	lb.	.70 @	.75
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiurad	lb.	— @	1.55
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.50 @	.75
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Next Column)			
Blues [b]			
Prussian	lb.	.36 @	—
Ultramarine	lb.	.17 @	.27
Browns [b]			
Mapico	lb.	.1135 @	—
Umber, Turkey	lb.	.04¾ @	—
Greens [b]			
Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¾ @	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.096 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¾ @	—
Whites [b]			
Cryptone No. 19	lb.	.0560 @	.0585
Cryptone CB No. 21	lb.	.0560 @	.0585
Cryptone ZS-800	lb.	.0825 @	.0850
Lithopone:			
Albalith	lb.	.04¼ @	.04½
Astrolith	lb.	.04¼ @	.04½
Azolith	lb.	.04¼ @	.04½
Ray-cal	lb.	.05½ @	.05¾
Rayox	lb.	.14½ @	.15¼
Titanox A	lb.	.14½ @	.14¾
Titanox B	lb.	.05¾ @	.06
Titanox C	lb.	.05½ @	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼ @	.07½
Anaconda, lead free	lb.	.07¼ @	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼ @	.07½
XX Red—4	lb.	.07¼ @	.07½
XX Red—72	lb.	.07¼ @	.07½
XX Red—103	lb.	.07¼ @	.07½
Kadox, black label—15	lb.	.07¼ @	.07½
Red label—17	lb.	.07¼ @	.07½
St. Joe, black label	lb.	.07¼ @	.07½
green label	lb.	.07¼ @	.07½
red label	lb	.07¼ @	.07½
U. S. P.—7, bbls.	lb.	.10½ @	.10¼

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½ @	.09¾
Green seal—8	lb.	.09 @	.09¼
Red seal—9	lb.	.08½ @	.08¾
Yellows [b]			
Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.071 @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow		.0355 @	—
Certified		.0355 @	—
Certified Spheron		.0355 @	—
Channel "S"		.12 @	—
Continental		.0355 @	—
Disperso		.0355 @	—
Dixiedensed		.0355 @	—
Dixiedensed 66		.0355 @	—
Excello		.0355 @	—
Furnex		.03½ @	.06
Furnex Beads		.03½ @	.06
Gastex		.03½ @	.06
Kosmobile		.0355 @	—
Kosmobile 66		.0355 @	—
Kosmos-Dixie 20	lb.	.03½ @	.06
Micronex (Amarillo)		.0355 @	—
Micronex Beads (Amarillo)		.0355 @	—
Pelletex		.03½ @	.06
P-33		.0475 @	—
Shell Carbon (Del. Midwest)		.025 @	—
Sterling		.035 @	—
Supreme		.0355 @	—
Thermax		.0225 @	—
Thermax "S"		.0675 @	—
Wyex		.0355 @	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	@24.50
99½%-300	ton	—	@16.50
86-90%-300	ton	—	@13.50
Asbestine	ton	16.50	@20.00
Atomite	ton	—	@27.50
Barium carbonate (98-100%)	ton	47.00	@49.00
Barytes	ton	25.35	@36.00
Bentonite	ton	11.00	@16.00
Blanc fixe, dry	ton	60.00	@67.50
Calcene	ton	37.50	@43.00
Catalpo (fact)	lb.	.02	@ —
Chalk, precipitated			
Suprex white	ton	32.50	@45.00
Clay, Aerfloted, Suprex	ton	10.00	@22.50
Aerfloted Paragon	ton	10.00	@22.50
Crown (f.o.b. plant)	ton	11.00	@ —
Dixie	ton	—	@10.00
Kaolloid	ton	—	@ 9.00
Langford	ton	—	@ 8.50
McNamee	ton	—	@10.00
Par	ton	—	@10.00
Witco	ton	10.00	@ —
Cotton Flock (Dark)	lb.	.10½	@ .13
Kalite No. 1	ton	—	@26.00
Kalite No. 3	ton	—	@36.00
Kalvan	ton	—	@100.00
Kalvan "S"	lb.	—	@ .09½
Keystone white	ton	—	@14.00
Magnesium carbonate	lb.	.06¼	@ —
Mineralite	ton	—	@30.00
Pyrax A	ton	—	@ 7.50
Rottenstone (powd. Dom.)	ton	25.50	@37.50
Rubberol	lb.	—	@ .17½
Silene (calcium silicate)	lb.	.04	@ .045
Snowflake white	ton	—	@16.00
Starch, powdered	cwt.	2.90	@ 4.10
Talc, domestic	ton	17.00	@25.00
Whiting, commercial	ton	16.00	@26.00
Columbia Filler	ton	9.00	@14.00
Witco	ton	6.00	@ —
Wood Flour (100 mesh)	ton	30.00	@32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00	@ —
Black Diamond	ton	25.00	@ —
Hard Hydrocarbon	ton	25.00	@27.00
MilliMar	lb.	—	@ .05½

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00	@ 4.50
Rodo #10	lb.	5.00	@ 5.50
Curodex 19	lb.	2.75	@ —
Curodex 188	lb.	3.50	@ —
Curodex 198	lb.	4.50	@ —
Para-Dors	lb.	4.50	@ —
Aresklene No. 375	lb.	.35	@ .50
Darvan (dispersing agent)	lb.	.30	@ .34
Santomerse S	lb.	.11	@ .25
Sponge Paste	lb.	—	@ .18
Sunproof	lb.	.22¾	@ .27¾
Tackol (tackifier)	lb.	.085	@ .18
Tonox	lb.	.50	@ .59
Ty-Ply	gal.	6.75	@ 8.00
Unicel (blowing agent)	lb.	.50	@ —

SOFTENERS

Acids			
Acetic, 28%, bbls. [a]	100 lb.	3.38	@ 3.63
Nitric, 36 degrees	cwt.	5.00	@ —
Acids, Fatty			
Laurex	lb.	.14¾	@ .17¼
SL #10	lb.	.12	@ .14
Stearex Beads	lb.	.10	@ .11
Stearite	lb.	.10	@ —

Alkalies			
Caustic Soda, 76%	cwt.	2.70	@ 5.70
Soda Ash, 58%	cwt.	1.15	@ 2.98
Oils			
Cycline Oil	gal.	.14	@ .20
Degras, bbls.	lb.	.11	@ .12½
Para-Flux	gal.	.17	@ .18
Para-Lube	lb.	.046	@ .048
Petrolatum, amber [b]	lb.	.03¼	@ .04½
Pigmentaroil ,tank cars	gal.	.20½	@ —
in drums	gal.	.26½	@ .27½
Pine, tanks	gal.	.55	@ —
Rosin Oil, cmpd.	gal.	.40	@ —
Rubberol	lb.	.13½	@ .14
Rubtack	lb.	.10	@ —
Seedine, c.l.	lb.	.07¼	@ —
Tackol	lb.	.08½	@ .18
Witco Palm Oil	lb.	—	@ —
Witco Softener No. 20	gal.	.20	@ —
Woburn No. 8, c.l.	lb.	.06	@ —
Resins and Pitches			
Pitch, Burgundy	lb.	.06	@ —
coal tar	ton	19.00	@22.00
hardwood	ton	16.00	@22.50
pine, 200 lb. gr. wt.	bbl.	—	@ 4.50
Pigmentar, tank cars	gal.	.20½	@ —
in drums	gal.	.26½	@ .27½
Retort Pine Tar, drums	gal.	.26½	@ .27½
Solvents			
Acetone, pure [a]	lb.	.07	@ —
Benzene, 90%, tank car	gal.	.14	@ —
Beta-Trichlorethane	gal.	—	@ .20
Bondogen	lb.	.98	@ 1.05
Carbon, bisulfide	lb.	.05	@ .08½
Carbon tetrachloride	gal.	.73	@ 1.27
Dichlorethylene	lb.	—	@ —
Dipentene, cml., drums	gal.	.48	@ .50
Ethylene dichloride	lb.	.07½	@ .08½
Plastogen	lb.	.07¾	@ .08
Reogen (drums)	lb.	.11½	@ .12
Rub-Sol	gal.	.09½	@ —
Trichlorethylene	lb.	.08	@ .09½
Turpentine, spirits	lb.	.78½	@ —
dest. dist., drums	gal.	.50	@ .55
Waxes			
Beeswax, white [b]	lb.	.61	@ —
Carnauba, yellow [b]	lb.	.87	@ .89
Ceresin, white, dom.	lb.	.13½	@ .15
Montan, crude	lb.	.45	@ .46
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04½	@ —
Refined, 123/125	lb.	.05¼	@ —

ANTI-OXIDANTS

Agerite Alba	lb.	1.95	@ 2.05
Gel	lb.	.52	@ .54
Hipar	lb.	.61	@ .63
Powder	lb.	.43	@ .45
Resin	lb.	.43	@ .45
Resin D	lb.	.43	@ .45
White	lb.	1.23	@ 1.33
Albasan	lb.	.69	@ .74
Antox	lb.	.54	@ .56
B-L-E	lb.	.43	@ .52
Flectol H	lb.	.52	@ .65
Flectol White	lb.	.90	@ 1.15
Neozone A, B, C, D, E	lb.	.43	@ .63
Oxynone	lb.	.77	@ .90
Retardex	lb.	.45	@ .48
Santoflex B	lb.	.52	@ .65
Santovar A	lb.	1.15	@ 1.40
S.C.R.	lb.	.33	@ .35
Stabilite	lb.	.52	@ .54
Stabilite Alba	lb.	.70	@ .75
VGB	lb.	.43	@ .52

EXTENDERS

Naftolen	lb.	.15	@ .25
Vanzak	gal.	.05	@ .06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35	@ .50
Cocoa Soapstock	lb.	.06	@ .08
Colite	gal.	.90	@ 1.15
Dipex	lb.	.06	@ .08
Glycerized Liquid Lubricant	gal.	—	@ 1.35
Lubrex	lb.	.25	@ .30
Mineralite	ton	—	@30.00
Mold Paste	lb.	.12	@ .18
Sericite	ton	65.00	@75.00
Soap Tree Bark, cut, sifted	lb.	.06	@ .08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25	@ —
Amberex Type B	lb.	.18¾	@ —
Black	lb.	.08½	@ .13
White	lb.	.09	@ .15
Brown	lb.	.10	@ .14
Neophax A	lb.	.16½	@ —

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08	@ .12
Sulfur Chloride, yellow (drs.)	lb.	.03	@ .08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55	@ —
Commercial (bags)	cwt.	2.20	@ —
Telloy	lb.	1.75	@ —
Vandex	lb.	1.75	@ —

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials

ACCELERATOR Z 51
- Good Aging Properties
- Free from Rapid Overcure
- Safe Processing Properties
- Low Dosages for Optimum Cures

Advance Solvents & Chem. Corp.
245 Fifth Ave. New York, N. Y.

CARBON BLACK-MICRONEX
The world's standard gas black; universally known as the "King of Rubber Pigments."
BINNEY & SMITH CO.
41 East 42nd St. New York City

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street New York City

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H. White; Santoflex B, BX; Santovar A.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

CARBON BLACK
A Grade for Every Requirement
CONTINENTAL "AAA"—Low heat generating, extremely easy processing. "AA"—Low heat generating, easy processing. "A"—Medium cure, medium processing. "D"—Standard Channel Black.
Continental Carbon Company
295 Madison Ave., New York, N. Y.

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St. New York

CHEMICALS

For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment, *Furnished to the rubber trade for 40 years.*
The Aluminum Flake Co.
Akron, Ohio

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CHEMICALS
For Natural & Synthetic Rubber
"PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

ALUMINUM HYDRATES
"Alorco" Hydrated Aluminas reinforcing pigments give many desirable properties to rubber. Send for sample.
ALUMINUM CO. OF AMERICA
1970 Gulf Bldg. Pittsburgh, Pa.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron Savings & Loan Bldg, Akron

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CARBON BLACK
WITCO DISPERSO
and DUSTLESS and a
Complete Line of High Quality
Rubber Chemicals
Wishnick-Tumpeer, Inc.
295 Madison Ave., New York, N.Y.

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

CALCENE—The Ideal low gravity, white reinforcing pigment. Gives high tensile and elongation properties with exceptionally good resistance to tear and abrasion.
PITTSBURGH PLATE GLASS CO.,
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh, Pa.

Do you believe in Your Products?
Then you should believe in telling the rubber industry about them. The MARKET PLACE is the logical place to display your wares.

COAL TAR CHEMICALS
Coumarone Resins — Tack Producers
Resinous Oils — Dispersing Oils
Reclaiming Oils — Softeners
Solvents
The Neville Company
Neville Island, Pittsburgh, Penna.

The Market Place

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Chemicals and Compounding Materials [continued]

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS

HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

FURNEX—FURNEX BEADS
The High Resilience
Semi-Reinforcing Black

BINNEY & SMITH CO.
41 East 42nd St. New York City

PARA-DORS—
overcome odors in rubber—effectively and at low cost.

GIVAUDAN-DELAWANNA, INC.
Industrial Aromatics Division
330 West 42nd St., New York, N. Y.

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures

MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.

Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

PARA-FLUX
The Universal Softener—Adaptable, Uniform, Improves Quality—Economical.

The C. P. Hall Co.
2510 First Central Tower
Akron Ohio

COMPOUNDING Materials

Vulcanizing Agents	Pigments
Accelerators	Clays
Antioxidants	Mineral Rubber
Plasticizers	Aromatics
Dispersions	Blacks

R. T. VANDERBILT CO.
230 Park Ave. New York City

IRON OXIDES
Asbestine—Barytes—Talc—
Soapstone

C. K. Williams & Co.
EASTON, PA.

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.

Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

CUMAR —Paracoumarone Resin.
A neutral gum for rubber compounding.
Samples and prices on request.

The Barrett Div.
Allied Chemical & Dye Corp.
40 Rector St. New York City

LAMP BLACKS
Produced according to the rigid specifications of the makers of EAGLE and OLD STANDARD Germantown Brands.

THE L. MARTIN COMPANY, Inc.
Unit of Columbian Carbon Co.
BINNEY & SMITH CO.
Distributor of Rubber Blacks
41 East 42nd Street New York, N. Y.

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS
E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.

J. T. Baker Chemical Co.
Phillipsburg New Jersey

RUBBER SUBSTITUTES
White, brown and black.

The Carter Bell Mfg. Co.
Springfield, New Jersey

EXTENDER
NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.

Wilmington Chemical Corporation
10 E. 40th St., New York, N. Y.

MAPICO COLORS
Pure Oxides of Iron
Yellows—Reds—Browns—Black
MAGNETIC PIGMENT CO.
Manufacturers
BINNEY & SMITH CO.
Distributors
41 East 42nd Street, New York, N. Y.

SOFTENERS
Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin

National Rosin Oil & Size Co.
RKO Bldg. New York, N. Y.

"FACTICE"—Prevents blooming, makes colors fast and a smoother batch.
(Reg. U. S. Pat. Off.)

Stamford Rubber Supply Co.
Stamford, Conn.

MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.

PROCTER & GAMBLE
Cincinnati Ohio

SOLVENTS
"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.

SKELLY OIL CO., SOLVENTS DIV.
Skelly Bldg., Kansas City, Mo.

The Market Place

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Chemicals and Compounding Materials (continued)

STEARIC ACID
STEAREX . . . CAKE or POWDER
STEAREX BEADS
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE
BINNEY & SMITH CO.
41 East 42nd St. New York City

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Johnson's lustrous wax finishes retard oxidation, reduce friction, surface wear, tackiness.
S. C. JOHNSON & SON, INC.
Racine Wisc.

ZINC OXIDE PIGMENTS
The XX Reds Kadox
ZINC SULPHIDE PIGMENTS
The Cryptones The Albaliths (Lithopones)
The New Jersey Zinc Sales Co.
New York Chicago
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SULPHURS
Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.
Stauffer Chemical Company
2710 Graybar Bldg., New York City

ZINC OXIDES
AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
American Zinc Sales Company
Columbus, Ohio New York
Chicago St. Louis

ZINC OXIDES
Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process
St. Joseph Lead Co.
250 Park Ave., New York
Plant and Laboratory: Monaca (Josephtown), Pa.

TITANIUM PIGMENTS
TITANOX
Unsurpassed in
OPACITY, WHITENESS, BRIGHTNESS
Titanium Pigment Corp., Sole Sales Agent, 111 Broadway, New York, N.Y.
104 South Michigan Ave., Chicago
350 Townsend Street, San Francisco
2472 Enterprise Street, Los Angeles

The Progressive Concern Selling to Rubber Manufacturers Uses THE MARKET PLACE for Results

ZINC STEARATE
ZINC LAURATE
Colite Mold Lubricant for Extra High Gloss
THE BEACON COMPANY
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BANBURYS REPAIRED
Re-building and re-surfacing rotors and mixing chambers has been our specialty for years.
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Specialists in Rubber Cutting Equipment for Bands, Crude Stock, Jar Rings, Tubes, Rollers, Washers, Treads, Cement Stock, etc.
See Black Rock for All Cutting Problems
Black Rock Manufacturing Co.
179 Osborne St. Bridgeport, Conn.

FORMS - PORCELAIN
Exclusive Manufacturers of Vitreous Porcelain Closed End Forms
No matter what shape or design—we can make it. Send blue print or sketch for our prices.
The Colonial Insulator Co.
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CALENDER SHELLS
Gammeter's
ALL STEEL Calender Shells.
All welded. Any size.
New and better.
The W. F. GAMMETER CO.
Cadiz Ohio

DIAL GAUGES—Thickness
For measuring the thickness of rubber and similar materials. Many models.
Frank E. Randall
248 Ash St.,
Waltham Mass.

GRINDING MILLS
SPAN grinding mill reduces soft and hard rubber to fine powder.
Made in U. S. A.
M. Pancorbo
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Cutting and perforating dies of all types for rubber manufacturers.
Send for our quotations
Brockton Cutting Die & Machine Co.
Avon, Mass.

DRYING MACHINERY
For Synthetic Rubber, Reclaimed Rubber, Latex Processed Materials, etc.
PROCTOR & SCHWARTZ, INC.
Seventh St. & Tabor Rd. Philadelphia, Pa.

MACHINERY—RUBBER
"Master" Tube Molds, Tire Vulcanizers, Molds and Cores, Tire Drums, Tubers, etc.
Special Machinery Built to Order
Akron Standard Mold Co.
Akron, Ohio

CUTTING DIES
Also Tools, Dies, Jigs, Fixtures. Machine Parts and Special Machinery. Now engaged in Prime and Subcontract Work, Defense and Civilian.
Independent Die & Supply Co.,
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EXTRUDERS
The pioneer line of tubers, strainers and wire insulating machines. For latest developments inquire of
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Paterson New Jersey

MACHINERY
L. ALBERT & SON
Trenton, N. J. Stoughton, Mass.
Los Angeles, Calif. Akron, O.

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Machinery and Equipment (continued)

MACHINERY
A complete service from the design of machinery to finished products of all kinds. Equipment for Plantations — also Reclaim, Latex and Rubber Plants.
Layouts — Formulas — Processes
Continental Machinery Company
305 BROADWAY, NEW YORK, N. Y.

MOLDS
For tires, rubber specialties and mechanical goods; general machine work.
The Akron Equipment Co.
Akron, Ohio

STOCK SHELLS
A Type for Every Need—Large Diameter—Light Weight — Extra Strong — Seamless.
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

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Cutting, Trimming, Skiving, Cementing, Eyeletting, Cutting Dies—Eyelets.
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140 Federal St., Boston, Mass.

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For Reclaiming Rubber
Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.
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TESTING MACHINES
RUBBER TENSILE TEST MACHINES
TEXTILE TESTING MACHINES
Write for Descriptive Literature
Henry L. Scott Co.
P. O. Box 963 Providence, R. I.

MAGNETIC EQUIPMENT of All Kinds
Separators, Drums
Clutches, Brakes
Rolls, Special Magnets
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Strips slab rubber up to 1" thick, 10,000 feet in 8 hours. Any width. Tolerance 1/64 to 1/100 inch. No rejects. Write for full details.
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For Rubber & Allied Industries
Mills, Calenders, Hydraulic Presses, Tubers, Vulcanizers, Mixers, etc.
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MANDRELS—All Types
Circular and Straight—Aluminum and Steel Licensed Under Clyde E. Lowe Co. Patents
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For Quality and Efficiency in Working Rubber. Consult us about your problems.
Utility Manufacturing Co.
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The National X-1-A Accelerated Weathering Unit quietly evaluates substitute materials, new formulas, established products.
NATIONAL CARBON CO., INC.
Carbon Sales Div.
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Rubber—Crude; Scrap; Latex; Dispersions

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BALATA—SYNTHETIC CHICLE
We handle Manufacturers' Crude Rubber and Balata Purchase Permits.
Charles F. Connor & Co., Inc.
110 State St. Boston, Mass.
Telephone: LAFayette 1202

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Water Dispersed Rubber
(Reclaimed—Crude—Synthetics)
Man-made Alternate for Latex
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Offices in Detroit, Boston, Indianapolis

LOTOL
(Compounded Latex)
Ready to use
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
Rockefeller Center, New York, N. Y.
Offices in Detroit, Boston, Indianapolis

CRUDE RUBBER
SCRAP RUBBER
Also HARD RUBBER DUST
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GUAYULE RUBBER
"AMPAR" BRAND
Washed and Dried
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REVERTEX
Highly Concentrated (About 75%)
Rubber Latex
Sole Distributor for U. S. A. and Canada
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CRUDE RUBBER
SCRAP RUBBER
HARD RUBBER DUST
BALATA — GUTTA PERCHA
Hermann Weber & Company
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LATEX
Normal, Concentrated, Processed
HEVEATEX CORPORATION
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RUBBER
Crude Rubber
Liquid Latex
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Cable Address: Jacobite Boston

The Market Place

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Rubber [Cont'd]

RUBBER—Scrap and Crude
Also HARD RUBBER DUST
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14th & Converse Sts., E. St. Louis, Ill.
738 Statler Bldg., Boston, Mass.
500 Fifth Ave., New York, N. Y.
Warehouses at Akron, E. St. Louis and Boston

VULTEX— THE ONLY VULCANIZED LATEX
Insures Highest Quality, Uniformity, Economy, Simplicity of Application.
FULLY PROTECTED BY PATENTS
Also Latex and Latex Compounds
General Latex & Chemical Corp.
Successors to the Vultex Chemical Company
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NERVASTRAL
RECLAIMING PROCESSES
HIGH GRADE — HIGH SPEED
HIGH ECONOMY
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Tel: COlumbus 5-0085

RECLAIMED RUBBER—
For All Purposes
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 Sixth Ave., N. Y. City

RECLAIMED RUBBER—
Uniformity, reliability, cleanliness
PEQUANOC RUBBER CO.
Butler, N. J.

High Grade
RECLAIMED RUBBER
Southwest Rubber Reclaiming Corp.
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RECLAIMED RUBBER—
A standardized grade for every requirement.
U. S. Rubber Reclaiming Co., Inc.
500 Fifth Ave., New York, N. Y.
"60 Years Serving the Industry Solely as Reclaimers"

Rubber—Synthetic

HYCAR
For extreme resistance to heat, abrasion, oil, gasoline, aging, and deterioration.
HYCAR CHEMICAL COMPANY
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NEOPRENE
In different types to meet stringent requirements.
The Neoprene Notebook carries up-to-date information on neoprene. Ask for it.
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Rubber Chemicals Div.
Wilmington Del.

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Oil Resistance—Heat Resistance
Long Life
Full information upon request.
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THIOKOL
Synthetic rubber available in several types, including powder form. Excellent heat and solvent resistance.
THIOKOL CORPORATION
Trenton N. J.

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Should be displayed in
THE MARKET PLACE
Show What You Have to Sell

Miscellaneous

Use the
MARKET PLACE
Section

To Display
Your Products
It Brings Results!

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RUBBER REPELLENT LINERS
Capitol Process Liner Treatment
—
Textile Proofers, Inc.
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"CLIMCO"—Fabrics treated to prevent adhesion of rubber stocks.
"LINERETTE"—Treated paper for separating or interleaving light weight rubber stocks.
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"BRATEX" Rubber Holland and special Starch Filled Glazed Sheetings for Waterproof Separator Cloths; Also Coated and Impregnated Fabrics.
The Holliston Mills, Inc.
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Consultants

CONSULTING
LATEX TECHNOLOGIST
—
R. J. Noble, Ph.D.
21 Woodland Road, Malden, Mass.

CONSULTING
Rubber Technologist
Natural and Synthetic Rubber
R. R. Olin Laboratories
P. O. BOX 372. AKRON. OHIO
Telephones: HE 3724, FR 8551

Rubber Mnfrs.

MECHANICAL MOLDED
RUBBER GOODS
Sponge Rubber: Sheeted—Die Cut—Molded
Your Inquiries Solicited
Barr Rubber Products Co.
Sandusky, Ohio

SANITARY GOODS—
Dress Shields, Baby Pants, Aprons, Elastic Belts, Bloomers, Stepins, Bibs, Guimps and Brassieres.
SPECIAL GOODS CUT TO ORDER
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POSITIONS WANTED

MAN with long experience in tires, mechanicals, sundries, etc.; acknowledged expert on product development and all phases of manufacturing with crude, synthetics and reclaims. Over draft age; willing to go anywhere. Address Box 1330, RUBBER AGE.

HELP WANTED

RESEARCH CHEMIST: For research on latex and synthetic rubber. Graduate study and some industrial experience desirable. Knowledge of colloid chemistry helpful. Plant in New England engaged in war work. Permanent position. Address Box 1322, RUBBER AGE.

CHEMIST WANTED by an old established mechanical rubber manufacturing plant located in Connecticut about 60 miles from New York City. Applicant must have had experience in rubber and synthetic rubber compounding. Please give full particulars in writing to Box 1323, RUBBER AGE.

MAINTENANCE ENGINEER with experience in rubber plant. Excellent opportunity for right man both now and after the war with established company in New England. Reply Box 1324, RUBBER AGE.

WANTED: RUBBER CHEMIST by a large organization to conduct research on organic and inorganic compounds in synthetic rubber. Knowledge of rubber compounding, organic and physical chemistry essential. New York area. State particulars including draft status. Address Box 1326, RUBBER AGE.

WANTED: By large supplier to rubber industry, a Technical Service man with organizational ability; must be experienced in natural and synthetic rubber, rubber and latex substitutes, etc. Wide acquaintance in rubber field desirable. Will also supervise other salesmen. Good salary to start. Send full details to Box 1328, RUBBER AGE.

CHEMIST and practical man knowledge of coating Nitro cellulose on cotton goods. Must have good references. Address Box 1329, RUBBER AGE.

SALESMAN, graduate chemist with technical sales experience to sell industrial and fine chemicals both to war and civilian industries in New York City. Permanent post-war position. Send complete details which will be held in full confidence. Address Box 1337, RUBBER AGE.

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Send in your advertising copy today!

EQUIPMENT FOR SALE

2—6′ x 15′ tanks.
2—10′ x 25′ tanks with removable heads, suitable for vulcanizers.
10—Sets adjustable tank supports with legs.
1—10″ x 22″ three roll calender.
1—John Waldron "German" mixer.
Address Box 1333, RUBBER AGE.

FOR SALE: 1—24″ x 66″ 3-roll calender; 1—W.S. 15″ x 18″ Hydraulic Press, 10″ dia. ram; 2—D. & B. 20½″ x 20½″ platens; 1—14″ x 24″ Press, 9″ ram; 9—24″ x 55″ Steel Cored Heating Platens; 1—Farrel-Birmingham 15″ x 36″ Rubber Mill; 4—W. & P. Mixers; Adamson 6″ Tuber; Hydraulic Belt Press, 6′ x 30′, with Belt Stretcher complete; Dry Mixers; Pulverizers, Grinders, etc. Send for complete list. CONSOLIDATED PRODUCTS COMPANY, INC., 14-19 Park Row, New York, N. Y.

EQUIPMENT WANTED

WANTED: Good used No. 3 Banbury Mixer. Address Box 1335, RUBBER AGE.

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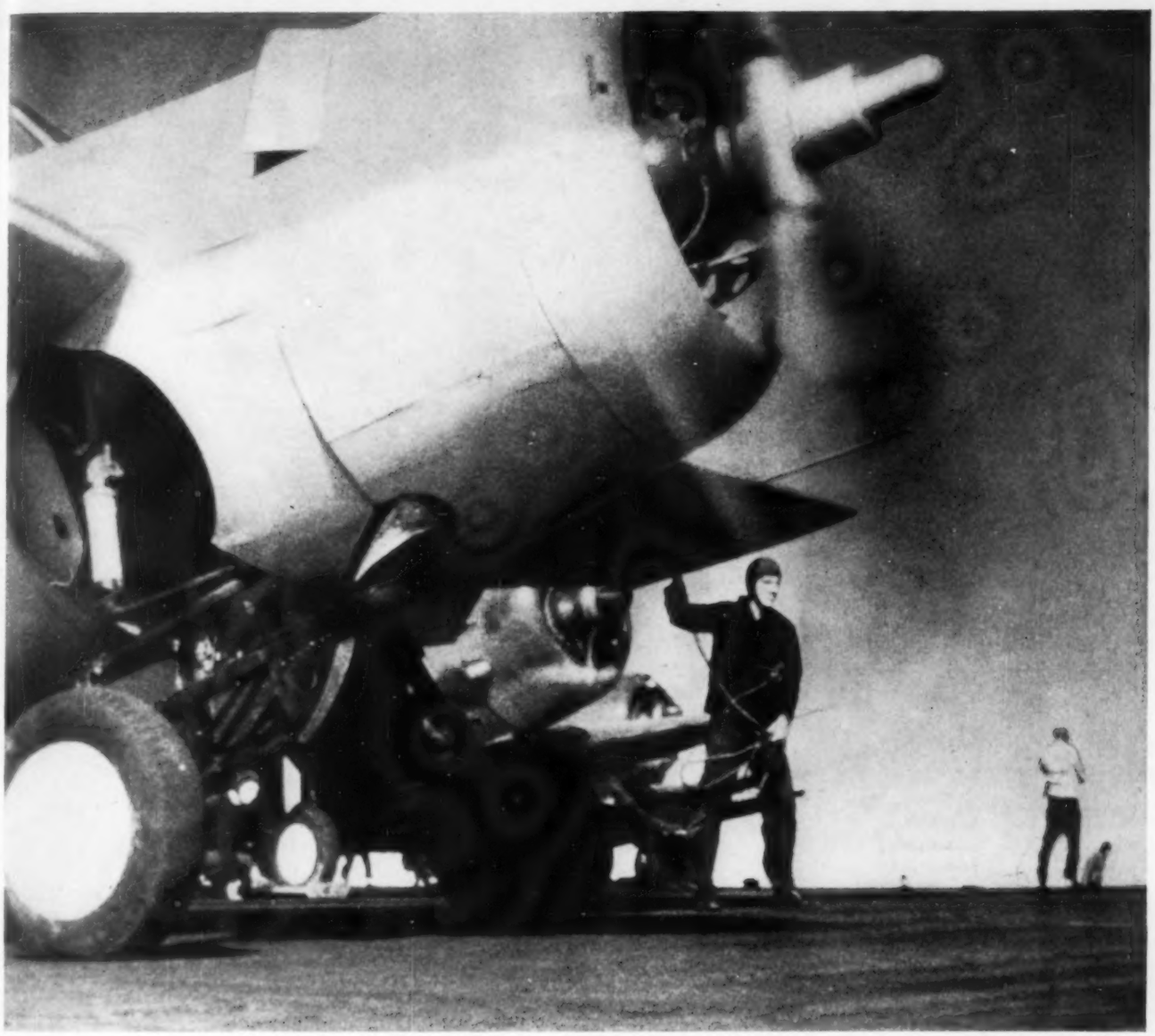

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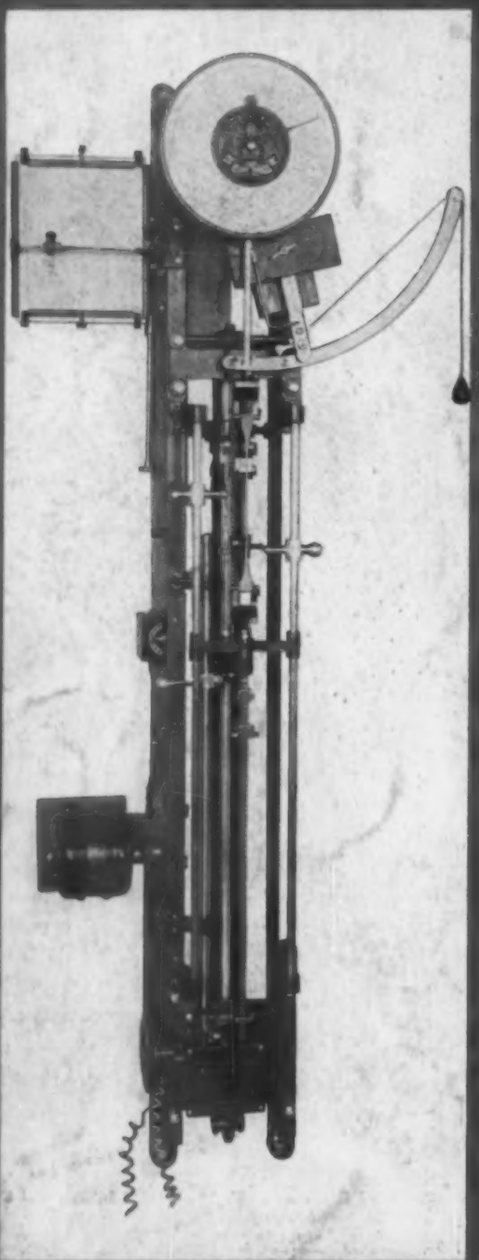

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